THE

GEOGRAPHICAL MAGAZINE.

DECEMBER, 1874.

THE ARCTIC EXPEDITION.

HER Majesty's Government, after careful and mature consideration of the subject in all its bearings, have decided upon despatching a naval expedition of discovery next year, to explore the unknown region round the North Pole. This wise and patriotic resolution will receive the warm and hearty approval of every true Briton throughout the length and breadth of the land.

The reasons for the decision are weighty and numerous, but it is satisfactory to know that there has been no undue haste; and that the Government have had the advantage of the experience of former Arctic voyagers, of the knowledge of the leading men of science in this country, and of the opinions of the representatives of the naval service, in forming their conclusions. The late Government had always, to its honour, acknowledged the importance of the objects to be obtained by Arctic discovery, and the late head of the Admiralty is known to have been very favourably disposed towards this most legitimate mode of utilizing our naval resources. He was unfortunate in not having been able, owing to various circumstances, to carry out the intentions which he was known to have entertained, and which would have been consistent with the rest of his naval administration.

It has been reserved for the Conservative Government, by despatching an Arctic Expedition, to adopt a wise measure in full accordance with the wishes alike of the naval service, of men of science, and of the whole people of this country. The experience of previous Arctic voyages had shown their scientific importance and their practical value. The discoveries of Hudson and Edge led to the lucrative Spitzbergen fishery, those of Davis to the fishery in the straits which bear his name, the first voyage of Ross led the way for the whalers into the "North Water" of Baffin's Bay, and those of Parry opened the road to Prince Regent's Inlet, while the despatch of the 'Intrepid' and 'Pioneer,' was the direct cause of the introduction of sharp bows and steam-power in ice navigation. Russian Arctic exploration opened up a valuable ivory trade; and no Arctic voyage has been devoid of practical utility, either direct or indirect. But the scientific objects of Arctic exploration are of still higher importance, especially now that the value of scientific research is fully recognized, and that the duty of the State to further and assist discovery is well understood. The Arctic Committees of the Royal Society and the Royal Geographical Society submitted a memorandum to the Government, in which the scientific results of Arctic exploration are fully explained, and it is sufficient to say that this memorandum is the joint production of Dr. Hooker, the President of the Royal Society, of Dr. Allman, of Mr. Prestwich, of Mr. Norman Lockyer, and of General Strachey, as regards the scientific details; and of Admiral Sherard Osborn, and other experienced Arctic authorities, as regards the practical portion; to show that it was prepared by the most competent persons that could be found in this country. The memorandum contains no "verbose grandiloquence" as has been erroneously stated in the *Times* of November 17th, but is a calm and plain statement of facts, which has carried conviction to the minds of all unprejudiced persons who have read it.

It seems necessary, in passing, to inform our readers that the account of the arguments in this memorandum which is given in the article in the *Times* above alluded to, is utterly incorrect in every particular. This article, which was intended to be mischievous, has entirely failed in its object, and it is, therefore, unnecessary to take further notice of it. But we may remark that, while giving a misleading version of the memorandum of the Arctic Committees, the *Times* has not allowed its readers the opportunity of judging for themselves by publishing that important document. It has appeared in the *Proceedings of the Royal Geographical Society*, and will also be found as an appendix to Captain Markham's *Whaling Cruise in Baffin's Bay*.

The present Government had before them a statement of the scientific and practical results of Arctic exploration, as set forth in the memorandum; they had the opinions of their official naval advisers; the memorial of the Dundee Chamber of Commerce, and they were aware of the almost unanimous feeling of the people of England in favour of the renewal of Arctic discovery. The resumption of this noble work recommended itself on every ground which should influence the judgment of statesmen, and the result of the deliberations of an English Cabinet when the subject was once brought fully before it, did not admit of a doubt.

The Government of Mr. Disraeli must, none the less, be congratulated on the adoption of a measure which will redound so much to its credit, and which will give such universal satisfaction throughout the country. The Arctic expedition will be fitted out at Portsmouth, under the able superintendence of Sir

Leopold McClintock, and all its details will be arranged by the most experienced living Arctic authorities. It will sail under the most promising auspices, and the navy of England will once more resume its legitimate work in time of peace by adding to the glorious Arctic achievements of former days, and by emulating the deeds of those naval worthies of our nation who have reaped immortal renown in those northern seas.

THE AUSTRO-HUNGARIAN POLAR EXPEDITION.*

IT was not the object of the Austrian Expedition to search for the unknown country which the results of our preliminary expedition, undertaken in 1871, had made it likely would be found to the north of Novaya Zemlya, but to discover a north-east passage. This, its principal object, the Expedition has failed to attain; and the country referred to was discovered instead.

The limited time, as well as the dignity of a scientific meeting require that in the following report all those events of a mere personal nature, and the adventures incidental to every Arctic Expedition, should not be dwelt upon, and this all the more as the limited time will not even permit us to treat facts of scientific interest at as great a length as we should desire.

The 'Tegetthoff,' a screw-steamer of 300 tons, left Bremerhafen on the 13th of June, 1872, furnished with stores and provisions calculated to last about three years. Including Captain Carlsen, the well-known Norwegian navigator, who joined the expedition at Tromsö, in the capacity of ice-mate and harpooneer, the crew numbered twenty-four men all told, amongst whom were sixteen Dalmatian seamen.

On the evening of the 14th of July we left Tromsö, shaping our course towards the north-east. A few days afterwards we doubled the North Cape, and, on the 25th of July, when in 74° 30′ N. latitude, and 48° E. longitude, we reached the edge of the packed ice, the unexpectedly southern position of which we had every right to consider a bad omen.

The masses of ice against which we had to struggle at that time, as well as those which we encountered subsequently, were certainly far less formidable than those with which we had become acquainted five years before, on the coast of Greenland, but they nevertheless seriously obstructed our progress. Large floes, separated by navigable lanes of water, were rarely met with, but immense quantities of broken fragments. Early in August we were actually beset for a few days, so as not to be able to move. Subsequently, however, we regained our liberty, and in latitude 75° N. we reached the open water extending along the coast of Novaya Zemlya. The decreasing temperature and quantities of ice showed, indeed, that the summer of 1872 was the very opposite of that of the year before. Aided by steam-power, we fought our way along the coast, through a second barrier of ice, and only reached open water in the latitude of William Island. When still a little south of that island, we were overtaken by the yacht 'Isbjörn,' in which Count Wilczek had effected his difficult passage from Spitzbergen, in order to establish a depôt for our use near Cape Nassau.

The two vessels kept company as far as the low Barents Island, where compact masses of ice, driven by south-westerly winds towards the coast, barred all progress for a week. Only on the 21st of August, the ice having exhibited symptoms of breaking up, we parted company, and the 'Tegetthoff' steamed slowly away towards the north.

But our hopes were vain! Night found us encompassed on all sides by ice—encompassed for two long and dreary years! Cheerless and barren of all hope the first year lay before us, for we were not any longer discoverers, but doomed to remain as helpless voyagers on a floe of drifting ice.

The unusually severe frost of the autumn of 1872 soon solidified the surrounding fragments of ice, from which neither sawing nor blasting were able to effect our release. All our exertions were frustrated by its incredible elasticity, and by the rapidity with which pieces sawn asunder froze together again. Thus fettered we drifted, at the mercy of the winds, towards the north-east.

Our position was thus sufficiently miserable, but on the 13th of October it became gloomy in the extreme. On that day the lethargy in which everything around us had so long been buried suddenly gave place to active commotion, and thenceforth we were exposed to the fearful pressure of the ice. Many a time we were summoned to be ready to save ourselves in case of the vessel foundering, and all this in the midst of a Polar night, and without knowing whither to turn for safety. Our vessel, however, bravely withstood the pressure, though the floe upon which it was fixed had been uplifted by others, which had forced their way under it, thus raising her aft, and causing her to lean over on the larboard side.

Preparations for passing the winter had by this time been made. The deck was covered with snow, an awning was spread from the mainmast forward; and a rampart of ice fixed round the ship. The latter required to be repaired frequently, in consequence of the havoc caused by the motion of the ice.

Special care was taken to keep the crew employed. Watches were set regularly, exercise was taken and school kept. On Sundays the members of the expedition met for a simple but impressive divine service under the awning, when the Bible was read in Italian, by the light of a train-oil lamp.

Meteorological observations were made regularly; Lieutenant Brosch, Midshipman Orel, Captain Carlsen, Lusina, and Krisch, relieving each other every two hours. The uncertainty of our position rendered it necessary to keep a watch constantly on deck, through whom we were regularly informed of the approach of ice-bears, whose flesh formed a most important addition to our diet. Nevertheless, the sanitary condition on board during the first winter left much to be desired, so that our excellent surgeon, Dr. Kepes, was kept fully occupied. Scurvy and affections of the lungs made their appearance in spite of every precaution, the former partly on account of the occasional congelation of the damp covering our cabin-walls, and partly owing to mental depression brought on by our critical position, and which only disappeared when our prospects became more hopeful, and the summer's work kept every one fully occupied.

* A paper, by Lieut. Payer, read before the Royal Geographical Society, November 10th, 1874.

Our small stock of wine was reserved for the use of the sick. The rest contented themselves with a daily allowance of artificial wine, which we prepared on board from glycerine, sugar, meat extract, tartaric acid, alcohol, and water. A small plank, suspended over the cabin stove supplied us every week with a little cress and cabbage for the scorbutic. The dogs—whose numbers by that time had been reduced to seven—were lodged on deck, in boxes filled with straw. They were fed, at first, with dried horse-flesh, and subsequently on the flesh of seals and bears.

On the 28th of October the sun disappeared below the horizon, not to rise again for 109 days. All the birds had left us, and during five long winter months we were obliged to burn lamps in our cabins. For weeks it was next to impossible to leave the ship. The Polar night was rarely of that indescribable clearness which has been noticed on land, and by ourselves on the coast of Greenland. Whenever a sudden change of temperature caused the expanse of ice to break up, dense vapours arose from the fissures, which not only further obscured the generally inky sky, but likewise produced that immense amount of precipitation which we experienced, especially during our second winter. A fine snow fell almost continuously. In the course of the winter of 1873-4 it attained a depth of 12 feet, and on the arrival of spring our vessel was completely buried in it, although nearly the whole of the snow which fell during the preceding winter had disappeared during the summer.

Our observations on the evaporation of the ice during the Polar night agree in the main with the results obtained by Parry on Melville Island. The winds nearly balanced each other as regards direction as well as force.

A hut of coal had been built on the ice, to serve as an asylum in case of the vessel being lost, but it was destroyed by a movement of the ice on Christmas Eve, and we considered ourselves fortunate in being permitted to spend Christmas Day itself in undisturbed tranquility, occupied with thoughts of home.

The first day of the new year brought with it no prospect of an early release. We were still drifting towards the north-east, and even imagined that we might be carried to the coast of Siberia. Fate, however, had ordained otherwise, for after we had crossed the 73rd degree of longitude, the wind shifted, and thenceforth, helpless as before, we drifted towards the north-west.

On the 16th of February the sun again made his appearance above the horizon, and on the 25th the pressure of the ice, which had tormented us hitherto, having literally hemmed us in by a wall of craggy ice-mountains, ceased as suddenly as it had begun. The cold continued to be severe: the mean temperature of February was —31° Fahrenheit, and towards the close of that month it reached its height —51° Fahrenheit. But this cold is borne easily, as the cabin affords ready means for warming one's self, and consequently several of our men only reluctantly put on their fur clothes when ordered on deck.

The Polar lights in their ineffable beauty illumined the heavens during the whole of the winter, but diminished in frequency as the days grew longer. They generally appeared in the south, and only rarely was more than one corona seen on the same night. Since the beginning of September they were the only incitation which we received from beyond. Like mighty streams they rushed over the firmament, sometimes from west to east, at others in a contrary direction, and the corona vanished as rapidly as it appeared. They were most intense between 8 and 10 in the evening, and their appearance was never attended by noise. Magnificent lights proved generally the forerunners of bad weather.

The auroras and magnetic phenomena were observed by Lieutenant Weyprecht, who will publish the results at an early date.

In the summer of 1873 our hopes of an early destruction of the floe, and consequent liberation, revived. In the course of the summer we observed a maximum temperature of 45.5° Fahrenheit; the black bulb thermometer occasionally indicated a solar heat of 113° Fahrenheit, and on days like these, when there was no wind, we had a sensation of stinging heat. The mean temperature of the past year had been 2.75° Fahrenheit. Our hopes were based upon the evaporation of the ice caused by the powerful effect of the sun, and upon its destruction by winds and waves, but not upon its melting in a sea the surface temperature of which never rose above freezing point. The progressive conversion of the surface ice into sludge was witnessed by us from day to day, the cliffs and walls of ice crumbling away, and evaporating until nearly the whole surrounding sea was covered with a thick chaotic layer of sludge.

Thus encouraged, we made fresh efforts to regain our liberty, and the months of May, June, July, and August were spent in futile attempts to saw through the ice which surrounded us. But our floe, which had attained a thickness of 40 feet in consequence of other floes forcing themselves underneath it, rendered all our attempts futile. The centre of our vessel, and the uplifted part abaft, remained immovably fixed upon the floe. The surrounding ice and snow having melted away and evaporated to the extent of 12 to 18 feet, we found ourselves fixed at a considerable elevation above the general level, and the danger of being capsized had to be provided against by supporting our masts with strong shears. I ought to state that our floe varied considerably in size from time to time. During the last winter it was shattered almost daily, but congealed again immediately. At the time now referred to (August 1873) it was 5 to 7 miles in diameter.

The northerly winds of July drifted us to the south, as far as latitude 79°, but August saw us again drifting to the north. I ought to state distinctly that nothing justified us in the assumption that the direction of our drift was at any time due to oceanic currents. The winds alone caused it, and a cessation of the wind led to a cessation in the movement of the ice. It struck us as remarkable that the direction in which we drifted was always to leeward, and that our vessel should have slued only to the extent of 1° in azimuth during the four preceding winter months.

In the course of the summer of 1873, when in about 79° N. latitude, and 60° longitude, we drifted over an extensive bank, our soundings, which had hitherto varied between 100 and about 275 fathoms, becoming much less.

The temperature of the sea was measured at different depths, and the use of the dredging apparatus resulted in a small zoological collection, only a portion of which we were able to bring to Europe. Drawings

of some of the specimens which we had to abandon have, however, been made.

Our hopes that the ice would break up grew less and less every day, though the familiar grating sound which proceeds from the ice giving way was heard frequently, and dark streaks on the horizon pointed to the existence of open fissures. We had already resigned ourselves to the necessity of being obliged to pass a second winter, as inactive and perilous as the first, when the state of affairs all of a sudden underwent a change in our favour.

We had long ago been drifted into a portion of the Arctic Sea which had not previously been visited, but in spite of a careful look-out, we had not been able hitherto to discover land. It was, therefore, an event of no small importance, when, on the 31st of August, we were surprised by the sudden appearance of a mountainous country, about 14 miles to the north, which the mist had, up to that time, concealed from our view.

At that moment all our past anxieties were forgotten; impulsively we hastened towards the land, though fully aware that we should not be able to get further than the edge of our floe. For months we were doomed to suffer the torments of Tantalus. Close to us, and, in fact, almost within reach, was a new Polar land, rich with the promise of discoveries, and yet, drifting as we were at the mercy of the winds, and surrounded by open fissures, we were unable to get any nearer to it.

At length, towards the end of October, we approached within three miles of one of the islands lying off the main mass of the land. Every other consideration was now thrown to the winds, and, making our way over the rugged, hummocky surface of the ice, we, for the first time, placed our foot upon land in latitude 79° 54′ N. The ice covering the sea close to the shore was only one foot in thickness, and it was clear that an open lane of water had existed periodically during the preceding summer. An island more desolate than that which we had reached can hardly be imagined, for snow and ice covered its frozen and débris-covered slopes. But to us it was of such importance that the name of Count Wilczek, the originator of our expedition, was conferred upon it.

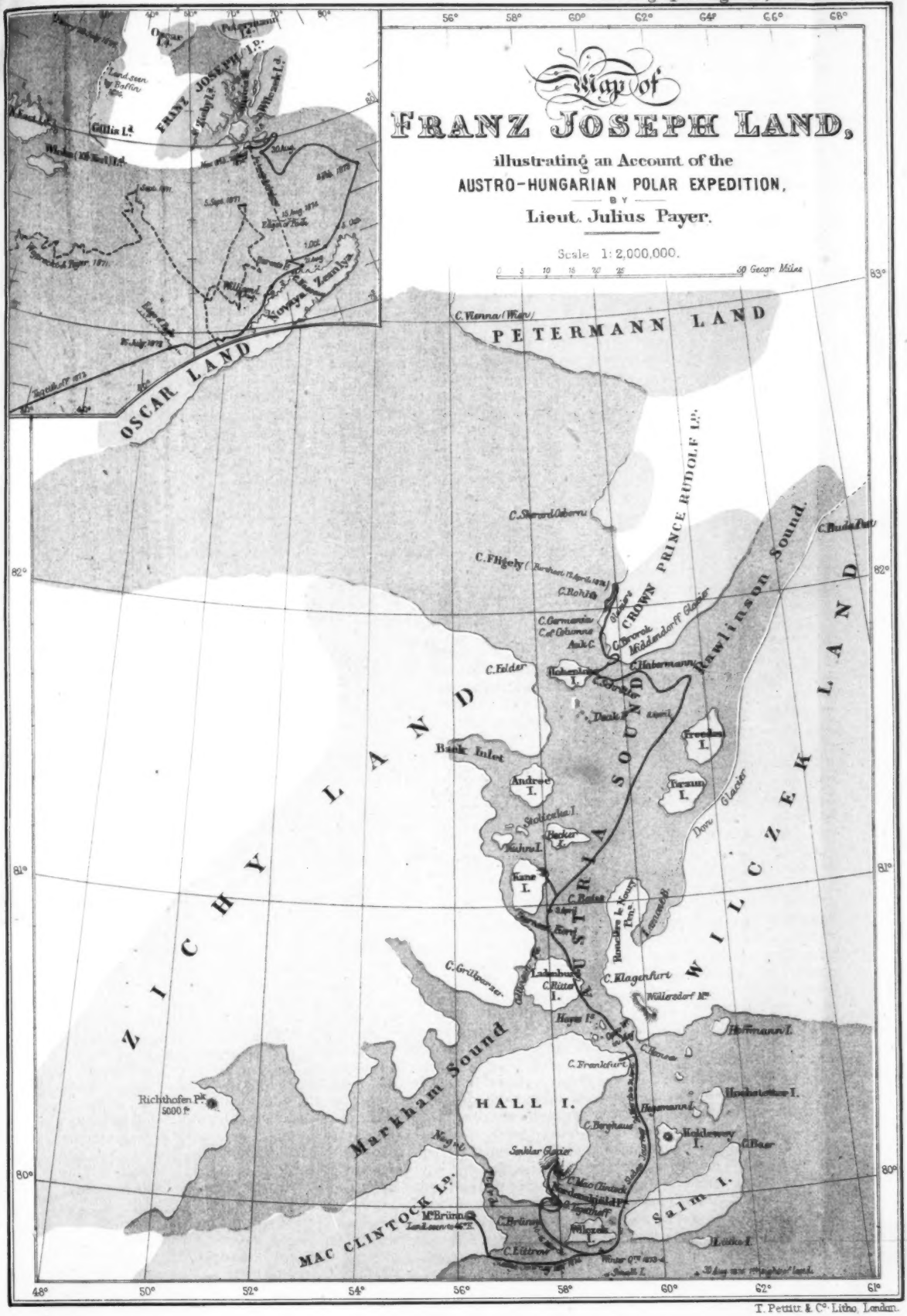
The sun had deserted us for the second time on the 22nd of October, but we availed ourselves of the few hours of twilight, vouchsafed to us for a week afterwards, to make a few excursions to a distance of 10 miles from the vessel, without, however, being able to enlarge our knowledge of the new country. Was it merely the southern capes of islands of small extent which we had before us, or a country of large extent? Nor were we able to determine whether the white patches, which we discovered high up between the mountain summits, were glaciers or not.

The increasing darkness of the Polar night for the present rendered every attempt at exploration impossible, and we feared lest northerly winds might drift us far away from our present position, before the approach of spring should enable us to commence our exploratory journeys. Nor was our position at the time at all a safe one. Southerly winds had driven us close to the land, and during the first half of October we still suffered seriously from the pressure of the ice. Our floe was shivered into fragments, and it almost appeared as if the anxious days through which we had passed were about to return. In expectation of an unfortunate issue, we took the same measures of precaution which we had taken during the preceding winter, and were ready to leave the ship at a moment's notice. Fortune, however, did not again forsake us, and we were permitted to pass the second Polar night (125 days in length) without suffering the horrors of the first. There occurred no further pressure from the ice, and our harbourless vessel, fixed to its floe, and surrounded for the first time by icebergs, remained immovable, close within the outer edge of the land-ice, and at a distance of 3 miles from the nearest coast.

This position enabled us to look towards the future with a certain amount of assurance; it rendered existence more endurable, and enabled Weyprecht, Brosch and Orel to determine the magnetic elements with a great amount of accuracy. Orel, moreover, determined the astronomical position of our winter-quarters, which he found to be in latitude 79° 51′ N., and longitude 58° 56′ E. During the winter of 1873-74 much more snow fell than during the preceding one, and snow-drifts, brought on by northerly winds, continued for days. At the height of the Polar night we were scarcely able to distinguish night from day, and were enshrouded in darkness for weeks. Christmas was celebrated in a snow-house, built upon our floe. In January the cold set in again exceedingly severe, and the mercury remained frozen for more than a week. The snow became as hard as pumice, and its surface granular. The petroleum in the glass lamps under the awning froze, the lamps went out, and even our cognac was changed into a solid mass.

The visits of bears were as frequent then as they had been at other seasons of the year; they came close up to the ship, and were killed by regular volleys fired from deck. The bears here are certainly much less ferocicus than those we met with in Eastern Greenland, where they not infrequently attacked us, and on one occasion even carried one of the crew out of the ship. Here they generally took to flight as soon as we made our appearance. As regards the disputed question whether bears pass the winter in a dormant state or not, we observed, that amongst the great number shot by us during two winters, there was not a single female, and during our second sledge expedition, in the spring of 1874, we even discovered a tunnel-shaped winter-hole in a snow-cone lying at the foot of a cliff, which was inhabited by a female bear and her cubs. On encountering bears we found it generally most advantageous to fire after they had approached within a distance of 50 or 80 paces.

A portion of the flesh of sixty-seven ice-bears which we killed, amounting altogether to about 12,000 lbs., proved to be the most efficient remedy against the scurvy, from which several of our men were again suffering. The care of our surgeon, as well as the reappearance of the sun, on the 24th of February, saved most of our patients from protracted suffering; but owing to our stock of medicines having become very much reduced, a third winter would certainly have exhibited far more unfavourable results. This consideration, joined to the certainty that our vessel was indissolubly fixed to the floe, which, in the ensuing summer would again drift about at the mercy of the winds, as well as the danger of its capsizing on the melting of the snow, led to the resolution to abandon



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the vessel, towards the end of May, and attempt a return to Europe by means of our boats and sledges. The interval was to be devoted to an exploration of the country by means of sledge expeditions, the fortunate termination of which must be left, in no small measure, to chance. For had the vessel been drifted away during the absence of the explorers they would have been exposed to certain destruction, and the crew remaining on board would have been weakened seriously. But the exploration of the country, lying as it did so invitingly before us, was considered to be worth the risk.

March had arrived, and although the cold was still severe, and the weather by no means favourable, the necessity of making the best of the short space of time at our disposal, induced us to start upon our first sledge expedition. On the 10th of March the Tyrolese Haller and Klotz, the sailors Cattarinich, Lettis, Pospischill, and Lukinovich, three dogs and myself, left the 'Tegetthoff' with our big sledge. We travelled in a north-westerly direction along the coast of the extensive Hall Island, ascended Capes Tegetthoff and McClintock, 2500 feet in height, and traversed the picturesque Nordenskjöld Fiord, the interior of which was bounded by the gigantic ice-wall of the Sonklar glacier. The land before us appeared to be utterly void of life; immense glaciers looked down upon us from between the desolate mountains, which rose boldly in steep doleritic cones and plateaus. Every object around us was clothed in a mantle of glaring white, and the ranges of columns of the symmetrical mountain terraces looked as if they were encrusted with sugar. In no single instance could we see the natural colour of the rock, as in Greenland, Spitzbergen, or Novaya Zemlya. This was owing to the immense precipitation and the moisture of the air, which condensed on coming into contact with the cold surface of the cliffs. The unusual moisture of the air, moreover, caused us frequently to over-estimate distances, which is quite contrary to the usual Arctic experience. Perfectly clear days were exceedingly rare.

The cold during this journey was very great, and amounted on one occasion to —58° Fahrenheit (on board ship it was —46·25° Fahrenheit). We were bound to exercise the greatest precaution; our nightly rest in the tent was disturbed, and the crossing of the Sonklar glacier, during a slight wind, was exceedingly painful. Our clothes were as stiff as a coat of mail, and even our rum, strong as it was, appeared to have lost both potency and fluidity. We slept in fur coats, but in the daytime we found that clothes made of the skins of birds were best adapted for resisting the rigour of the climate. In spite of every precaution, however, we suffered much from frostbites, against which a mixture of iodine and collodion proved most efficacious.

Immediately on our return to the vessel, on the 16th of March, we set about making preparations for a second sledge expedition, which was to extend over thirty days, and was to be devoted to an exploration of the land in the north. Soon afterwards one of our companions (Mr. Krisch, the engineer) succumbed to a protracted tuberculosis of the lungs, aggravated by scurvy. On the 19th we buried him in a lonely spot surrounded by columnar basalt, and erected a wooden cross upon his grave.

On the 24th of March we started for the north. Our party included Mr. Orel, the two Tyrolese, three sailors (Zaninovich, Sussich, Lukinovich), and myself. We all wore snow spectacles, blinkers, masks covering half the face, knitted woollen gloves, and sail-cloth boots. We were armed with double-barrelled Lefaucher rifles having a calibre of 12^{mm} and firing explosive bullets and steel-pointed projectiles. In preparing our equipment we followed explicitly the advice given by Admiral Sir Leopold McClintock, and the successful issue of our expedition is due, largely, to this circumstance.

Our team of dogs, unfortunately, was not any longer complete, and only three of them assisted us in dragging the large sledge, which carried stores and provisions weighing 16 cwts. The rest of the dogs were either dead or incapable of rendering service, but even the three remaining ones, being powerful animals, proved valuable auxiliaries.

The temperature during this journey, quite contrary to our expectations, did not fall below —26·50° Fahrenheit, but snowdrifts and moisture, the opening of fissures in the ice, and the flooding of our path by the sea, gave us much trouble.

The results of this journey cannot be fully appreciated without reference to maps and sketches, and anticipating the chronological order of our report, we will at once state that the newly-discovered country equals Spitzbergen in extent, and consists of several larger masses of land—Wilczek Land in the east, Zichy Land in the west—which are intersected by numerous fiords, and skirted by a large number of islands.

A wide sound—Austria Sound—separates these masses of land. It extends north from Cape Hansa to about latitude 82° N., where Rawlinson Sound forks off towards the north-east. The latter we were able to trace with the eye as far as Cape Buda-Pest.

The tide rises about 2 feet in Austria Sound, and exercises but a small effect, merely causing the bay-ice to break near the coasts. Dolerite is the prevailing rock. Its broad, horizontal sheets and the steep table-mountains, which recall the Ambas of Abyssinia, impart to the country its peculiar physiognomy. Its geological features coincide with those of portions of North-Eastern Greenland. A tertiary carboniferous sandstone occurs in both, but only small beds of brown-coal were discovered. On the other hand, amygdaloid rocks, which are so frequent in North-Eastern Greenland, were not met with in Francis-Joseph Land, and whilst the rocks in the south were frequently aphanitic in their texture, and resembled true basalt, those in the north were coarse-grained and contained nepheline.

It is an established fact that portions of North-Eastern Greenland, Novaya Zemlya, and Siberia, are being slowly upheaved, and it was therefore very interesting to meet with raised beaches along the shores of Austria Sound, which attested that a similar upheaval was taking place here likewise.

The mountains, as a rule, attain a height of 2000 or 3000 feet, and only towards the south-west do they appear to attain an altitude of 5000 feet. The extensive depressions between the mountain-ranges are covered with glaciers of those gigantic proportions only met with in the Arctic Regions. Only in a few instances were we able to determine the daily motion of the glaciers by direct measurements. On the coast they usually form mural precipices, 100 to 200 feet in height. The Dove Glacier on Wilczek Land is

undoubtedly one of the most considerable of the Arctic Regions.

The glaciers visited by us were characterised by their greenish blue colour, the paucity of crevasses, an extraordinarily coarse-grained ice, a small development of moraines, slow motion, and the considerable thickness of the annual layers. The *névé*, or glacial region above the snow-line, was much less elevated above the sea than in Greenland or Spitzbergen.

Another peculiarity which characterises all the low islands in the Austria Sound, is their being covered by a glacial cap.

The vegetation is far poorer than that of Greenland, Spitzbergen, or Novaya Zemlya, and excepting in the Antarctic Regions, no country exists on the face of the earth which is poorer in that respect. The general physiognomy of the flora (but not that of the species) resembled that met with in the Alps at an altitude of 9000 or 10,000 feet. The season during which we visited the country was certainly that in which vegetable life first puts forth its appearance, and most of the slopes were still covered with snow, but even the most favoured spots near the sea-level, which were no longer covered with snow, were unable to induce us to arrive at a different conclusion. On level spots even we scarcely met with anything but poor and solitary bunches of grass, a few species of saxifrage, and *Silene acaulis*. Dense carpets of mosses and lichens were more abundant, but most abundant of all was a lichen, the winterly *Umbilicaria arctica*.

Driftwood, mostly of an old date, was met with on many occasions, but only in very small quantities. We once saw, lying only a trifle higher than the waterline, the trunk of a larch, about a foot thick and some 10 feet in length. The driftwood, like our vessel, had probably been carried to these latitudes by the winds, in all likelihood from Siberia, and not by currents.

The country, as might have been supposed, has no human inhabitants, and in its southern portion scarcely any animal excepting ice-bears are met with.

Many portions of the newly-discovered country are exceedingly beautiful, though it bears throughout the impress of Arctic rigidity.

Our first sledge journey, as well as those undertaken subsequently, convinced us of the difficulty which any future expedition would meet with in discovering a harbour to winter in, no locality suitable for such a purpose having been discovered by us.

It has always been a maxim of Arctic explorers to name their discoveries in honour of the promoters of their enterprise, or of their predecessors. The countries discovered may never become of commercial importance, but the only manner in which I was able to record my gratitude towards those who had devoted their means to the success of our expedition, consisted in connecting their names with the newly-discovered countries. The name of H.M. Francis Joseph was consequently bestowed upon the whole of the country discovered by us, and other names to its several parts.

Owing to the mist which generally hung over the ice, we should not have been able to trace the northerly direction of the Austria Sound, had we not frequently ascended high mountains. The ascents of Capes Koldewey (80° 15′), Frankfurt (80° 25′), Ritter (80° 45′), Kane (81° 10′), and Fligely (82° 5′), moreover enabled us to survey the surrounding country and to select the most suitable tracks to follow.

An uninterrupted expanse of ice, with numerous icebergs scattered over its surface, extended from coast to coast. It was evidently of recent formation, and numerous fissures, and barriers formed of hummocks, crossed it in many places, and constituted serious obstacles to our progress, which we were able to surmount only at a vast expenditure of time and labour. Our track then led over this expanse of ice and starting from Cape Frankfurt, at the portal of Austria Sound, it led us through regions with respect to which we had learnt nothing during our first sledge journey. Omitting, for the present, all details concerning our journey, it may suffice to state that we crossed the 80th degree of latitude on the 26th of March, reached the latitude of 81° on the 3rd of April, and observed, five days afterwards, the latitude of 81° 37′. We imagined at that time that we had approached nearer to the Pole on land than had ever been done before, for we were not then aware that the American Expedition under Hall had reached 82° 9′ N. on land, and 82° 26′ by sea, the year before.

To the south-east of Crown Prince Rudolf Land we turned into the vast Rawlinson Sound, which promised to lead us almost straight to the north. But we soon got entangled in a chaotic mass of ice, which, owing to its height, prevented us from seeing the land, and through which it required our utmost exertions to force our way. The small horizontal intensity of the needle, moreover, which is but natural in such a high latitude, repeatedly made us lose our way, and finding that the hillocks of ice became more formidable in proportion as we advanced, we changed our course, and returned to the Austria Sound. We frequently encountered ice-bears whilst in Rawlinson Sound. They came towards us whenever they caught sight of us, and fell an easy prey to our rifles.

The decrease of our provisions and the want of time at our disposal, made forced marches necessary, and necessitated a separation of our party. The large sledge, with Haller and four others, was left behind in latitude 81° 38′, under a cliff of Hohenlohe Island, whilst Orel, Zaninovich, and myself, with the dog-sledge and half the tent, continued the journey. The sledge was now drawn by two dogs only, the third, a Lapland reindeer dog, having some time previously perished in a snowstorm. Haller was ordered to wait a fortnight for our return, and then to make the best of his way back to the vessel.

Our first aim was to cross Crown Prince Rudolf Land in a northerly direction. This necessitated our crossing the extensive Middendorf Glacier, which past experience and the great cold justified us in believing to be possible, and we at once set about it. After a laborious journey along the long terminal cliff of the glacier, we at length succeeded in gaining its surface, but had scarcely proceeded a hundred paces, when an immense crevasse swallowed up Zaninovich, the dogs, and the heavily-laden sledge. Mr. Orel, fortunately, had remained some distance behind, and I escaped a similar fate by cutting through my harness. Not being able by myself to extricate those engulfed, I ran back to Hohenlohe Island, 12 miles distant, whence I quickly returned with the rest of our party. By means of long ropes we succeeded at length in raising man, dogs, and sledge to the surface, and were fortunate in being able to continue our journey on the following day without having sustained serious injury.

The men returned to the depôt; and our small party, having abandoned the treacherous surface of the glacier, gained the western coast of the island by a circuitous path, along which we travelled to the north. Here we were destined to witness a most striking change in the aspect of nature. A water sky, of a dusky colour, made its appearance in the north; foul, yellow vapours collected below the sun, the temperature rose, the ground under our feet became soft, and the snowdrifts broke under us with a rumbling noise. We had previously noticed the flight of birds from the the north—here we found the rocks covered with thousands of auks and divers. They rose before us in immense swarms, and filled the air with the noise of their vehement whizzing, for breeding-time had arrived. Traces of bears, hares, and foxes were met with everywhere, and seals reposed sluggishly upon the ice. We were justified, therefore, in believing that open water was near at hand, but personal observations which we were able to make on the following day, after we had ascended the hills, and the results of which I have embodied in a sketch, showed that even our not very sanguine expectations, as regarded the extent of open water, were not realized.

Our track, henceforth, was far from safe. We were no longer travelling over old ice, but over a crust of young ice, hardly 1 or 2 inches thick, covered with salt, very flexible, and crossed by veritable walls, built up of fragments resulting from recent fractures of the ice.

We tied ourselves to the rope, carried our things separately, opened a path with the axe, and continually examined the thickness of the crust which bore us.

We rounded Auk Cape, which resembled a gigantic aviary, and reached the two lonely rocky towers of the Cape of Columns. Here we first found open water extending along the coast.

This distant world was sublime in its beauty. From a height we looked down upon the dark sheet of open water, dotted with icebergs like so many pearls. Heavy clouds hung in the sky, through which penetrated the glowing rays of the sun, causing the water to sparkle; and above was reflected the image of another sun, but of a paler hue. At an apparently immense height the ice-mountains of Crown Prince Rudolf Land, bathed in a roseate hue, stood out clearly visible through the rolling mists.

The 12th of April was the last day of our advance to the north, and, although not perfectly bright, it was more so than most of its predecessors. The thermometer stood at +54·50° Fahrenheit.

From the Cape of Columns, owing to the open water referred to, it was not any longer practicable to travel over the ice, and we were compelled to take to the hills.

On starting, we buried our baggage in the crevasse of a glacier, in which we had slept, and where it was safe from prowling ice-bears, and with the dog-sledge we travelled over a snow-field towards the hills, which were 1000 to 3000 feet in height. On reaching the prominent, rocky Cape Germania, observed the meridional altitude (81° 57′ N.). Here we left the sledge, and, tied to the rope, crossed the *névé* of a glacier, which descended in gigantic steps towards our left. But the many crevasses which obstructed our path, and into which we broke frequently, as well as the certainty of having reached latitude 82° 5′ N. after a march of 5 hours since noon, induced us to abandon further discovery, and having pushed to the north for seventeen days, we halted on the height of Cape Fligely.

We were now in a position to judge of the extent of coast-water. It turned out to be a "polynia" bounded by old ice, within which floated ice-masses of recent formation.

As I am anxious on this occasion to confine myself to a record of facts, I abstain from entering upon a discussion concerning the navigableness and nature of those portions of the Arctic Ocean which have not hitherto been seen by anyone.

There cannot, however, be any doubt that the facts observed and the sight upon which we looked from Cape Fligely, spoke as little in favour of the theory of those who believe in the existence of an open Polar Sea, as of those who maintain that the Polar basin is covered with ice throughout the year. The truth will probably be found to lie between these two extremes. The hope of finding a navigable sea in latitudes not hitherto attained, is not yet extinct, and is most likely to be realized by hugging the coast, but depends in a large measure upon a favourable year.

The success of an expedition sent out to attain the highest possible latitude depends, moreover, largely upon the route selected. The plan of penetrating through Smith Sound, which has been advocated in this country, appears to offer most advantages in these respects. Any theoretical reasons adduced in favour of this route are seconded most powerfully by the fact that a very high latitude has been reached here on repeated occasions. If an expedition should succeed in reaching a winter-harbour in a latitude as high as that reached by the last American expedition, it would then be in a position, by means of extensive sledge-journeys along the coast, to reach a latitude in the course of spring, the attainment of which would be attended by far greater difficulties along any other route.

Our own track to the north of Novaya Zemlya carries no weight in considering this question, for we are indebted for our progress to a floe of ice and not to our own exertions. The difficulties which any succeeding navigator would have to contend with on this route may be estimated from the fact, that on our return we found the sea encumbered with ice to such an extent that even boat navigation was hardly possible, and we were obliged to haul up our boats many hundred times, and drag them over the ice. We certainly should not have been able to return in our vessel, although the summer of 1874 was exceptionally favourable.

But if an expedition be fitted out, not with a view of reaching the highest possible latitude, but to study the nature of Arctic countries, then the interior of Greenland would certainly appear to be deserving of the first consideration.

But our neighbourhood was at that time of more immediate interest to us than the question of the navigableness of a remote portion of the Arctic Ocean. We had before us extensive lands, covered with mountains, and bounding a wide sound stretching towards the north-east, which we were able to trace as far as latitude 83° N. where the imposing Cape Vienna forms the western extremity of a country upon which I conferred the name of Petermann, to whom geographical

science, and particularly Arctic explorers, are so largely indebted.

Crown Prince Rudolf Land extended towards the north-east, its furthest visible point being a cloud-wrapped rocky promontory, in latitude 82° 20′ N., named in honour of Admiral Sherard Osborn.

Two other localities visited by us, but not on this occasion, were named after two other renowned English navigators, viz., Admirals Collinson and Back.

We do not desire to start any fresh theory with reference to the distribution of land around the Pole, but the coasts, as well as the gigantic glaciers, certainly gave us the impression of having entered a group of islands of considerable extent, thus partly confirming Petermann's theory of an Arctic archipelago.

The innumerable icebergs met with in all the fiords of Francis-Joseph Land formed a remarkable feature, for to the south of it—that is in the Novaya Zemlya Sea—scarcely any were met with. We are not in a position to ascribe the presence of these icebergs to ocean-currents, though their absence in the Novaya Zemlya Sea would appear to point to their finding an outlet towards the north.

Having planted the Austro-Hungarian banner upon the furthest point reached by us, and deposited a document testifying our presence in a cleft of the rocks, we turned back towards our vessel, which lay some 160 miles to the south.

Having rejoined our comrades, who anxiously waited for our return, at Hohenlohe Island, forced marches, and a deliverance from all impediments, excepting the tent and provisions, soon brought us to lower latitudes. But after we had crossed the glaciers of the imposing Ladenburg Island, and reached Cape Ritter (19th April), we were disquieted by the observation that the sea water had permeated the lower layer of snow, whilst a dark water-sky hung over the broad entrance to the Markham Sound. On retiring to rest we distinctly heard the grinding noise of ice, and the surge beating against the shore.

The next day found us on an iceberg, not far from the Hayes Islands, with open water in front of us, and no boat to cross it. The water set rapidly towards the north, owing, probably, to the tide. The southern portion of Austria Sound had been converted into a "polynia," and at a distance of thirty paces from where we stood the surf lashed the ice. After erring about for two days, during a fearful snowstorm, we managed, by following the land and the mural terminations of glaciers to get round this open water, which shut off our return, and it was with a feeling of deliverance that we again stepped upon the solid ice near Cape Frankfurt. Our last apprehensions were removed when we found that our vessel had not drifted away, and on the 24th of April we again met the 'Tegetthoff,' on the very spot to the south of Wilczek Island where we had left her thirty days before. A few days had necessarily to be devoted to repose; for although we had eaten the flesh of eight bears, which we killed during our journey, this addition to our diet was not sufficient to counterbalance the reduction in our strength brought about by the extraordinary exertions which we were called upon to undergo, when dragging a sledge for eight to ten hours at a stretch, and a night's rest of only five hours' duration.

Our third sledge journey was devoted to an exploration of the extensive McClintock Island. Brosch, Haller, and myself, with the dog-sledge, joined in it. When about 40 miles to the west of our ship we ascended a high mountain, and were able to survey the country as far as about longitude 46° E. It was mountainous in character, the mountains again bearing a great resemblance to the Ambas of Abyssinia, and attained its culminating point in the Richthofen Peak, about 5000 feet in height. Closely packed ice covered the sea towards the south, as far as the eye could reach, and rendered our prospects of a speedy return home by no means cheerful.

On the termination of this journey, Lieutenant Weyprecht measured a base-line on the ice near the ship, and we then considered that we had done everything in our power to accomplish the objects of the expedition, and our thoughts were directed exclusively upon our return home.

The period immediately before starting was devoted to recruiting our strength. We took leave of the grave of our departed comrade, and of the country which the caprice of a floe of ice had enabled us to discover. On the 20th of May, in the evening, the flags were nailed to the masts—an affecting scene for all of us—and we started upon our return home.

IRRIGATION IN SOUTHERN INDIA.

THE TAMRAPARNI SYSTEM.

IN our last number we endeavoured to describe a project by which the thirsty plains of Madura, on the eastern side of the Indian peninsula, will some day receive the longed-for moisture from the surplus floods which are now poured uselessly into the western backwaters. We now propose to go a little further south, and treat of the district of Tinnevelli, which does receive a sufficient supply, and where the only questions are how best to preserve and utilize it.*

The Tamraparni is the only river south of the Kaveri which receives its supplies from the S.W. monsoon. The Vaigai, in Madura, does not yet, as we have already seen. South of it are the two rivers of Gundu in Madura, and Vaipar with its tributaries, draining the northern *taluks* of Tinnevelli, which have their sources on the eastern slopes of the mountains, and beyond the reach of the S.W. monsoon. Their supplies are consequently scanty and uncertain. On the Gundu the waters from the local rains, the whole amount of which does not exceed 18 inches in the year, are turned to advantage, by a large but loosely-built stone dam of great antiquity, east of the town of Kamudi, and 18 miles from the sea. Here a channel carries off the waters of the Gundu in an easterly direction, to the Kallavi Lake. The river is useful to the villages near its banks, though the supply of water is very uncertain. Several stone *anicuts* and temporary dams across the beds of the Vaipar and its tributaries replenish the tanks, on which all depends. The Vaipar system thus supplies the two northern *taluks* or districts of Tinnevelli, called Strivilliputtur and Sottar. The soil is a fine black

* The map facing page 329, in our last number, shows the position of the Tinnevelli district, and the general course of its principal river, the Tamraparni.

mould of great fertility, yielding crops of cotton, tobacco, gram, and coriander; and the black sand contains iron ore, whence iron used to be extensively forged at several places, especially at Rajapaleijam, and exported to the fairs of Travankur.

South of the Vaipar comes the Tamraparni, the one really perennial river on the east side of the Indian peninsula, south of the Kaveri. The feeders of this river have their sources in the forest-clad mountains which separate Tinnevelli from Travankur, and sufficiently distant from their eastern scarps to be within the area covered by the S.W. monsoon rains. It is this circumstance which causes the prosperity of Tinnevelli. The rivers Tamraparni and Chittar pour the volumes of their waters down the cataracts at Paupanasam and Kurtallum respectively, and unite on the plain, where they give rise to a bright green belt, some miles in width, on either side of their banks. These rivers are the principal sources of the fertility of the district of Tinnevelli, the most southern in British India, which covers an area of 5176 square miles, and has a population of 1,693,959 souls.

The first duty of the Government, in connection with this system of water supply, is to preserve the forests from destruction, in the mountain ridge which divides Tinnevelli from Travankur. Near Cape Comorin the isolated masses of weather-beaten rock rise abruptly from the plain, and form an outline of battlements and pinnacles against the sky. The continuous range only commences north of the Aramboli Pass, where the mountains attain a height of 3000 feet and upwards. Further to the north are the frowning mass of Maha-Indra-giri, and the sharp pointed cone of Agustia-mulla, 6200 feet above the sea, on which Mr. Allan Broun, the eminent astronomer to the Raja of Travankur, perched his observatory. There is a notable difference in the climate on either side of these mountains. On the west side the slopes are abundantly watered by the S.W. monsoon, and the streams fall into the Travankur backwaters, supplying the narrow strip of land with ample means of irrigation. On these Travankur hills, therefore, clearing may be carried on to any extent without detriment to the low country. In February 1874, the coffee planters were clearing 10,000 acres on the western side of the frontier hills. But, on the east side, the due supply of water for the tanks and channels is a necessary of life to the people inhabiting the Tinnevelli plain. Indiscriminate felling on these eastern slopes would lead to most deplorable results, and the evil has already been partially felt. As long ago as in 1865 it was urged that too much felling must lessen the rainfall; and that, in clearing for coffee or other cultivation, 50 yards of forest at least should be left on the margins of streams. The work of destruction went on. The forests were thrown open to charcoal-burners and firewood-cutters, and any one who obtained a license might cut and hack as he pleased. People stripped certain trees of their bark, and cut down others to get the honey that might hang on the branches. The net annual forest revenue in Tinnevelli is only 340*l.*; a sum which, even from this lowest point of view, can scarcely be put in comparison with 100,000*l.* of revenue derived from the water supply that depends upon the due conservancy of the forests.

In 1872 Mr. Puckle, the Collector of Tinnevelli, received charge of the forests, and immediately adopted effective measures for their preservation. It was first necessary to provide for all the reasonable wants of the villagers dwelling at the foot of the hills, as regards grazing and firewood cutting. For this purpose numerous tracts were allotted on the spurs and hill sides, entry into the forests above being prohibited, and the system of felling on license being abandoned. Thus the forest officers can now control the felling, while the tracts in which the rivers rise are strictly protected. One important duty to the people will thus be efficiently fulfilled. For there can be no more short-sighted policy than to allow the villagers to waste and destroy forests on the preservation of which not only the prosperity but the very existence of the population of a whole district may be involved. It is perfectly true that the forests are the property of the people; but for the very reason that they are the property of the whole people, and not of the few villagers and wanderers who happen to live in or near them, it is right and just that they should be preserved and protected from waste and destruction.

It will, perhaps, be interesting to examine, briefly, the system by which the water, the supply of which is thus secured by the conservancy of the forests, is utilized when it reaches the plain. The drainage area of the Tamraparni is 200 square miles. In the forest where the river rises the rainfall is between 200 and 300 inches, in the plains near the foot of the hills it is 30 inches, and nearer the mouth of the river only from 18 to 20 inches a year. The course is for about 20 miles in the forest-covered mountains, and 70 in the plains.

The Tamraparni flows in a rapid current for about 11 miles, and then drops over a fall of 100 feet. Thence, by minor falls, the river descends 200 feet in 4½ miles to the Vanathirtam Cataract, which is 150 feet high; and, finally, it drops over the Paupanasam barrier, about 250 feet, into a basin. The tributary Chittar descends to the plain by a picturesque waterfall at Kurtallum; and these cataracts are considered sacred, and are believed to wash away original sin. Hither the ancient kings went to enjoy the summer, pavilions and pagodas were erected, and pilgrims crowded to the holy sites. When the English occupied the district, in 1800, they were attracted by the renowned beauties of the falls, and, through the persevering efforts of Mr. Casamajor, in 1801, a garden was formed at Kurtallum, containing coffee, nutmegs, and other spice trees. The lovely scenery, at Paupanasam and Kurtallum, has been rendered familiar through the labours of Thomas Daniell, whose drawings, made during the last decade of the last century in almost all parts of India, were executed with such care and accuracy as to bear the test of comparison with recent photographs.

After passing the falls, the rivers leave the moist forests with their 200 inches of rain every year, and enter upon the eastern plain. The climates of the east and west coasts are entirely different, and while, in June and July, they are reaping in Travankur, in Tinnevelli they are preparing the soil. On the Tinnevelli side the scanty rains from the N.E. monsoon commence in the middle of October, and last until December. For the rest of the year the heat is excessive, and from February to June all nature is parched up. The S.W. monsoon on the opposite

coast supplies occasional showers, and cloudy weather in the districts near the foot of the hills; but nearer the sea there is no such relief.

Into this dry and thirsty land the rivers bring the life-giving water obtained from the other coast; and the people have put it to good use. The system of irrigation is entirely of native origin, and some of the works are of great antiquity. They consist of dams or *anicuts* placed across the rivers to raise the water to a level with the land, and of channels on either bank, to carry it to the fields. There are seven *anicuts* on the Tamraparni, four on its tributary the Chittar, and two on the Mannemutu-ar. The first dam across the Tamraparni, called the Thalay *anicut*, is at Paupanasam, just below the falls, and consists of stakes and brushwood, renewed every year, whence a channel is led off on either bank, the north one 10 and the south one 6 miles long, both ending in tanks. Six miles lower down is the Nathianni *anicut*, a very ancient structure, consisting of large blocks of stone, placed obliquely across the river, and 468 feet long. Only one channel flows from it for 12 miles, on the north bank, which irrigates 1119 acres, yielding 1297*l.* of revenue. A mile and a half below the Nathianni is the grand Kannadian *anicut*, built of cut stone, 9 feet high, with a top width of 6 feet, and a large rough apron, varying in width from 35 to 160 feet. The *anicut* is divided into two by a rocky island, and a noble channel is taken from it on the south side, which is 22 miles long, and irrigates 9574 acres, yielding 17,981*l.* of revenue. The Kannadian channel flows through the town of Seran-mahadevi, 9 miles west of Tinnevelli, and between it and the river the country is one sheet of rice, interspersed with groves of palmyra palms. Six miles below the Kannadian *anicut* is that of *Kodagun*, 2287 feet long, built of cut stone, but roughly put together. It provides for one channel on the north side, 10 miles long, which irrigates 5433 acres, yielding a revenue of 6106*l.* The Palavur *anicut*, two miles east of the town of Seran-Mahadevi, is 2532 feet long, and a channel flows from it, on the south side, for 26 miles, supplying 54 tanks, and terminating below the town of Palamcottah. It irrigates 2865 acres, which yield 5468*l.* of revenue. A mile and a half below Palavur is the Suttamelli *anicut*, divided by a rock into two portions. A large breach in it, caused by freshes in the river, was repaired in 1855. The channel from it, on the north side, is 14 miles long, and then forks into two streams flowing through the city of Tinnevelli, called Suttamelli and Aruapuram. The former channel bears a name which means "pure woman," from the tradition of a wrongfully accused queen having proved her innocence on its banks by the fire ordeal. These artificial streams irrigate 1806 acres, yielding 3299*l.* of revenue, and the city of Tinnevelli, with its great and wealthy temple, built, as Mr. Fergusson tells us, almost exactly on the plan of Herod's temple at Jerusalem, lies in a setting of brilliant verdure. It was on the irrigated land of these channels that, upwards of sixty years ago, Mr. Hughes formed his indigo and senna farm, and gardens and other rich cultivation still line their banks. The largest *anicut* of native construction is 18 miles below that of Suttamelli, and 27 from the sea. This is the *Murdur*, of curious horseshoe shape, with the curve up the river, 4028 feet long, and supplying a channel on either side. At the head of the south channel there is a large *calingulah*, or escape weir, of beautifully cut stone-work. These channels run in and out of several large tanks, and irrigate 14,400 acres, yielding a revenue of 17,700*l.* Below the Murdur *anicut* there are four channels, irrigating 4280 acres of land, which yield 4980*l.* of revenue.

Such is the native system of irrigation from the Tamraparni, which supplies 39,578 acres, yielding a revenue of 56,828*l.* They might, doubtless, be improved and extended, but as they are they serve a great purpose, and have done so for centuries. Our simple duty, which has not always been very efficiently attended to in the years that are gone, is to keep the works in thorough repair. It appears that the repairs have only cost 1½ per cent. on the revenue.

In spite of the water taken off by the seven *anicuts* and channels for irrigation, a large surplus went to the sea, which might also be made to do its share in fertilizing the land. It was to utilize this surplus that the construction of another *anicut* was proposed at Striviguntum, 12 miles below Murdur, where the minimum discharge is 198 cubic feet per second in the driest month. For six months the discharge is 79,000 cubic yards per hour, which is sufficient to irrigate 39,000 acres at the rate of 2 cubic yards per acre per hour. The Striviguntum project was originally designed by Colonel Horsley, in 1855. It was matured, in 1868, by Captain Prendergast and Lieutenant Shepherd. The *anicut* is to be 1380 feet long by 6 high and 7½ broad at the crown. The foundations are on wells; on either side there is to be a head sluice to regulate the supply, and under sluices. The work is designed to irrigate 32,000 acres, 15,000 on the north, and 5000 on the south side. The people took so great an interest in the work that they voluntarily subscribed Rs. 20,000 towards it, and its construction was sanctioned in 1869 at a cost of 83,160*l.* Good progress has since been made; and, as 76,878*l.* had been expended up to the year 1873, it may be presumed that the work is approaching completion.

The comparative density of population is one test of the dependence of the well-being of the people on these irrigation works. The most populous taluk, or district, in the Tinnevelli Collectorate is that of Ambasamudrum, through which the Upper Tamraparni flows, and where the Kannadian and other channels convert the country into one sheet of verdure. Here there are 539 souls to the square mile. The Tinnevelli taluk has 504, and the Tenkasi, watered by the Chittar River, 514; while the Attapidaram taluk to the eastward, where there is no irrigation from rivers, only has 258 souls to the square mile. The average number throughout the Tinnevelli Collectorate is 327 to the square mile. This is about the same density as in Trichinopalli, South Arcot, and Malabar; while Tanjore, which is one sheet of irrigated land, has 600; and the other districts of the Madras Presidency have only from 100 to 200 inhabitants to the square mile. The amount of irrigation is an exact gauge of the density as well as of the prosperity of the people.

Tinnevelli, with its 1,693,959 souls and 403,803 houses, is a wealthy and prosperous district, owing to the geological accident that the rivers plunge over the Kurtallum and Paupanasam falls, instead of being diverted to the westward by a barrier ridge, as is the

case with the Periyâr in the Madura district. Hence, in addition to its 884,566 acres of dry grain crops, including cotton, there are 208,660 acres of irrigated land, making a total of 1,093,226 cultivated acres, yielding a land revenue of 285,655*l.* Tinnevelli, besides the coffee and spices in the hills, and the rice crops on the irrigated tracts, is one of the four principal cotton districts in the Madras Presidency, the average cultivation of that staple covering about 190,000 acres.

In Madura and Tinnevelli there are two contiguous districts with the same climate and rainfall, and the same soils; but in Madura there is no such expanse of fertility as may be seen from the summit of one of the gopurams of the Tinnevelli temple. And this difference depends upon whether the moisture contained in the clouds which are driven across the Indian Ocean upon the western faces of the ghauts, is diverted, when condensed, to the right hand or to the left. On this apparent accident rests the question of wealth or indigence for vast tracts of country. As regards Madura the barrier ridge diverts the water to the westward; and here the agency of man should step in, and cut a way for the life-giving element into the eastern plain. For Tinnevelli nature has herself done the needful work, and the beneficent floods pour over the sacred falls at Kurtallum and Paupanasam. Here the duties of the rulers of the land are simpler and less arduous. These duties are to protect the forests which regulate the supply, to keep the ancient irrigation works in thorough repair, and to utilize the surplus water escaping to the sea, by constructing supplementary works. All these measures have been, or are being taken; and Tinnevelli, with its busy port of Tuticorin, is among the most flourishing districts of British India.

C. R. M.

"FROM CHINA TO PERU."*

THE EMIGRATION QUESTION.

IT has often been conjectured that the first settlers in South America, the men who founded the byegone civilisations of the Toltecs, the Chibchas, and the Yncas, made their way across the Pacific from the eastern empires of Asia to the shores of Peru. Many centuries have passed away, and once more the stream is setting in the old direction, in order that the waste places of the new world may again be peopled, and better homes may be provided for the overcrowded labourers in the teeming east. Such tendencies cannot be stopped. It is the part of true statesmanship, not to hinder the inevitable course of events by interposing obstacles, but to guide and direct it by wise provisions and watchful superintendence.

Three centuries ago the Empire of the Yncas contained an ample population; which was thinned down to its present condition by the colonial policy of Spain. Tier upon tier of terraced cultivation once lined the now desolate alpine slopes, and a civilized race, long since utterly extirpated, peopled the fertile valleys of the coast. The system of *mitas* or forced labour in the mines, manufactories, and farms, depopulated the country of the Andes, and on the coast a whole race was swept away and partially replaced by imported negro slaves. The policy of which this was the result had always been opposed to the feelings and interests of the people of the country, and when the independence of Peru was proclaimed in 1821, one of the first acts of the young Republic was the adoption of a scheme for the gradual emancipation of the slaves; long before such a measure was seriously considered in the English Parliament. The emancipation, which was wisely effected by progressive stages, was made complete in 1855, when the proprietors received a compensation of $300 for each slave. The condition of the Indians was also improved by the expulsion of the Spaniards, and the declaration of independence in Peru. The *mita* or forced labour was entirely abolished in 1825; and in 1854 the *tributo* was also put an end to, a tax which was the equivalent to the land tax in British India. The modern Peruvians have indeed set a noble example as regards the treatment of the labouring classes, both in legislation and in practice; and the burning indignation felt and expressed by Colonel Espinosa, in his noble work *El Diccionario para el Pueblo*, whenever he treats of slavery or forced labour, is fully shared by a large proportion of his countrymen.

The landed proprietors of the coast and *sierra* of Peru are, as a class, most kindly and considerate employers of labour. The present writer has travelled for hundreds of miles along the coast and over the Andes, sojourning at the cotton, vine, and sugar estates in the different valleys, and he gladly bears his testimony to what he saw. The negroes were a happy and contented race, endeared to their masters by the traditions and the experience of kind and considerate treatment. In these Peruvian *haciendas* one is aroused by the voices of girls and women, who all repair to the door of the chapel, and chant a hymn of praise upon their knees. This is repeated at sunset, when the hours of labour are concluded. The days of work are varied by *fiestas*, and the people are well fed and housed within the spacious *galpones*. The Chinese labourers have, it is true, introduced a disturbing element, and the want of women among them is a deplorable aggravation of the position. But the state of things is gradually improving, while the additional labour is extending cultivation and enriching the country. For the proprietors of estates in Peru are an excellent class of country gentlemen, and habitually considerate in the treatment of their dependents. Such men as the Count of Monte Blanco, the Count of Torres de Oran, Don Mariano de Osma, Don Pedro Paz Soldan, Don Manuel Quintana, and a host of others of similar stamp, are not to be spoken of in the same breath with ordinary planters and speculators, whether English or American. Peruvian *hacendados*, such as those I have mentioned, have received their estates from their forefathers, and are not planting adventurers merely seeking to make money rapidly. There is another class of proprietors and renters who have more recently acquired estates, such as Mr. Henry Meiggs, Mr. Reid, Mr. Swayne, and Don Antonio Ramos, and they are also upright and humane landlords, as a rule. Among the great employers of Chinese labour in Peru, the name of Henry Meiggs may be specially mentioned. He pays many of his

* *Memoria que el Ministro de Estado en el despacho de Relaciones Exteriores presenta al Congreso Ordinario de* 1874. (Lima, 1874.)

labourers largely in excess of the wages stipulated in contracts, as an incentive to peaceful industry, or as the reward of it.

The emancipation of the slaves, and the extension of cultivation gave rise to a very urgent demand for labour on the Peruvian coast estates, and in November 1849 the Chinese labourers began to arrive. The immigration was at first encouraged by the Peruvian Congress, and $30 was paid for each man. This system of giving bonuses was revoked in 1853. Between 1850 and 1853, 2516 coolies were landed in Peru; and from 1860 to 1872 the number increased to 80,458. The misfortune, in the conveyance of the coolies from China to Peru, was that the business fell into the hands of private speculators, whose sole object was to make money out of the traffic. Agents and brokers, for enlisting coolies, established themselves at Macáu, and there was much kidnapping, over-crowding, and ill-treatment. But these evils have been grossly exaggerated. They were the inevitable consequences of allowing arrangements for a system of emigration on a large scale to fall into private and irresponsible hands. This is what has almost always happened when the demand for labour first arises, and the same irregularities and abuses have occurred in the beginnings of colonization by all other countries. It is, therefore, stupidly unjust to impute to Peru and the Peruvian people the evils of a system which has ceased to exist, and which the Peruvian Government has always endeavoured to prevent. Far worse atrocities than the Peruvians have ever been accused of, have, under a similar system, been habitually committed in recent times by natives of Britain; and the countrymen of the ruffians who owned the notorious schooner 'Carl,' should remember that a bad system is not peculiar to Peru.

The system of emigration from China to Peru was never, in the worst times, so bad as that introduced by British subjects between the New Hebrides and Salomon Islands and some British settlements. The ships taking coolies from Macáu to Callao may be divided into two classes—first, those belonging to the emigration companies established at Lima, and second, those which were hired. The first class consist of large well-found vessels, with 6½ feet between decks, and sufficient space for each emigrant. These ships are well ventilated, and there is provision for medical attendance. The 'Isabel,' 'America,' 'Camilo Cavour,' 'Fray Rentos,' and 'Rosalla,' are good of their class; and Messrs. Samuda have recently built a steamer on purpose for this traffic, in which hygiene and ventilation have been especially studied. The rations for each cooly are sufficient, and include rice, *frijoles*, preserved vegetables, and fish, tea, and tobacco. The vessels of the second class, which are generally French, and are hired for the voyage, are not so good, and it is on board these that the abuses and cases of neglect, which have been so much talked of, and so seldom proved, have occurred, or are alleged to have occurred.

It is then to a system which has prevailed, and has led to excesses among Englishmen, quite as much as among Peruvians, that the evils are due, and not to any nationality—namely, the system of allowing arrangements for emigration to fall into private hands. This system has now ceased to exist as far as Peru is concerned, and all just reason for discouraging emigration to that country has ceased with it. But even while the Chinese immigrants were brought to Peru through this objectionable agency, the Government of that country has steadily endeavoured, by legislation and negotiation, to correct the evil. In February 1872, a Consular Convention was entered into with the Portuguese Government to prevent abuses at Macáu, and the Peruvian Executive, in their anxiety to remove all just cause of complaint, empowered the representative of Portugal to take diplomatic charge of the interests of the Chinese in Peru. But, as we explained in our previous number (p. 343), the Government of Portugal afterwards abolished contract emigration of Chinese colonists through the port of Macáu altogether, from the end of March 1874. This wise and enlightened measure must finally put a stop to all the irregularities and cruelties that have been complained of, by suppressing the illicit kidnapping and overcrowding, which are the natural consequences of a system of private speculation through irresponsible agents or brokers. It will necessitate the establishment of direct emigration from China, under government superintendence, and on fixed conditions formally arranged by treaty. While on one side of the Pacific the Portuguese authorities have taken this decisive step to put a stop to irregularities and abuses in the shipment of emigrants, the Peruvian Government has been equally mindful of the interests of the imported labourers on the other. By a decree, dated October 14, 1873, it was enacted by the Congress of Peru that there should be a department, in the office of the Prefecture of Callao, to register all contracts, and to enforce their exact fulfilment. Two Asiatics, as agents of police and interpreters, are to be attached to this department, which will be in correspondence with the sub-prefecture of every province in which contract emigrants are employed. On the day after the arrival of an emigrant ship at Callao, the agents are bound to submit a list of the emigrants, with the estate to which each is to go, the date of contract, the day on which it terminates, and the nature of the work on which each will be employed. Copies of these registers are to be sent to the sub-prefects of the respective provinces. At the expiration of a contract the master is bound to report that the emigrant is free, at the office of the sub-prefect of his province, on pain of a fine of 100 *soles*, and, if the emigrant desires to return to his own country, the introducer is bound to find him a free passage.

Thus the most sincere and effective endeavours have been made, by the Peruvian authorities, to ensure justice and liberal treatment to immigrant labourers; and it was also determined to take similar steps with reference to their engagement and passage, by direct negotiations with the Chinese Government. At this juncture, in 1872, an event occurred which rendered the despatch of a Peruvian Mission to Japan indispensable, and advantage was taken of it to negotiate treaties with both the great powers of Eastern Asia. A vessel of 600 tons, called the 'Maria Luz,' commanded by a Captain Herrera, had sailed from Macáu with 225 emigrants on board, and put into the Japanese port of Yokohama from stress of weather in July 1872. It appears that, during the night of July the 13th, one of the emigrants swam to H.M.S. 'Iron Duke,' and it was somewhat gratuitously assumed and reported to the Japanese authorities that there was ill-

treatment on board the emigrant ship. The result was that the Peruvian captain was tried, and sentenced to receive 100 lashes, though a pardon was granted: all the emigrants were taken out of the ship, and the owners were subjected to heavy losses. This extraordinary proceeding was reported to the Peruvian Government, and the President, Don Manuel Pardo, resolved to despatch an embassy to demand reparation for the outrage, and at the same time to establish treaty relations with Japan and China.

Don Aurelio Garcia y Garcia, a captain in the Peruvian Navy, was selected for this important mission, and the instructions for his guidance were embodied in a very able State Paper by the Peruvian Minister of Foreign Affairs, Don J. de la Riva Agüero, dated December the 3rd, 1872. Commercial relations, it is stated, have long existed between Peru and Eastern Asia, and even in Spanish colonial times maritime expeditions frequently sailed from Callao and other Peruvian ports to the Philippine Islands. Since 1815 there has been direct trade with China, and since 1849 those Chinese labourers have annually arrived, without whose aid the progress of agriculture in Peru would have been impossible. After referring to the abuses of the cooly traffic, the instructions dwell upon the importance of establishing relations with China on a definite and permanent basis. The points which the envoy was to secure and to undertake were, freedom for Chinese subjects to emigrate, guarantees of good treatment during the passage, and strict fulfilment of contracts. He was to propose the adoption of the rules which were agreed to between England and China in March 1866, and promulgated as imperial laws in 1868; and he was desired to make the spirit of these laws the basis of his negotiations. The Government of Peru, he was reminded, far from approving of any previous outrages and irregularities, is animated by an earnest desire to enforce the same regulations as have been adopted by the English Government, and he was instructed to invite China to send special commissioners to Peru to watch over the exact fulfilment of all contracts. The Envoy was also to negotiate a treaty with Japan, and to investigate the affair of the 'Maria Luz.'

Señor Garcia y Garcia arrived at Yokohama on February the 27th, 1873, and, after a friendly reception, he opened his commission by recapitulating all the particulars of the 'Maria Luz' outrage, and demanding reparation. In a long and erudite reply the Japanese Minister quoted the authority of numerous publicists, and endeavoured to establish a distinction between foreign ships and their passengers. After some further fencing, the question was settled on June the 19th 1873, both parties agreeing to submit it for arbitration to the Emperor of Russia, and a protocol was drawn up and recorded to that effect. Negotiations were then opened for a treaty of friendship and commerce between Japan and Peru, which was signed on August the 21st 1873, Peru obtaining all the privileges of the most favoured nations, including freedom of emigration.

The Peruvian Envoy then proceeded to China, and reached Tientsin on October the 31st 1873, where he opened negotiations with Prince Kung through the Viceroy of Chihli. Here Señor Garcia y Garcia met with difficulties which appear to have taxed all his diplomatic abilities to overcome. The Chinese authorities had received false and exaggerated accounts of the condition of their compatriots in Peru. Some of them, it was said, had sent petitions in which they complained of being insulted, overworked, and ill-used; while the emigrant ships were overcrowded and ill-found. This Chinese despatch concludes with the preposterous demand that the whole of the emigrants in Peru should be reshipped to China. In a very able and detailed reply, the Peruvian Envoy stated that compliance with such a demand was out of the question, for that the Chinese in Peru, when their contracts were at an end, became citizens of the country of their adoption, and that many of them had acquired wealth, and could not be forcibly removed from a free country. He added that such a proceeding could only be compared with the barbarous expatriation of the Moriscos from Spain by Philip III. He then explained the regulations that had been made for the proper treatment of the emigrants, on the voyage, and in Peru. Señor Garcia y Garcia appears to have caused a favourable impression by this rejoinder, for he was invited to Peking on the 21st of December 1873, and, after much discussion, a treaty of friendship and commerce was signed between China and Peru on the 26th of June 1874. Señor Garcia y Garcia has conducted these difficult negotiations, requiring much tact, judgment, and patience, with distinguished ability, and most complete success.

By the new Treaty between China and Peru free emigration is allowed under certain regulations, and a line of steamers will probably convey emigrants, under strict government supervision. It is also provided by a Special Note signed on the same day, that a Chinese commission shall visit Peru, in order to inspect and report upon the condition and prospects of the emigrants. The Peruvian Government agrees to give the Members of the Commission the fullest assistance in the fulfilment of their duties, to compel employers to provide passages home to time-expired Chinese labourers, and to place all Chinese subjects on the same footing, in every respect, as those of the most favoured nation. A sort of *avant courier*, in the shape of a confidential agent, arrived at Lima last September. He will visit the principal estates along the coast, and prepare the ground for the official Chinese Commission shortly to arrive in Peru, according to the provisions of the Treaty. The emigrants, instead of being the scum of Southern China, will now come from the northern provinces, and will be a far superior class. A line of screw steamers, with a guarantee from the Peruvian Government, will probably be established to convey them, and the accommodation and provisions will be strictly regulated and inspected by official agents.

The Chinese Commissioners will find their compatriots in Peru in a far more contented and prosperous condition than has usually been represented, and it is understood that the Agent, who has already arrived, has actually received very favourable impressions. Many of the Chinese, who have served out the terms of their indentures, are engaged in business or have become domestic servants, and there are even two prosperous firms in Lima composed of Chinamen, who receive large consignments. There is a Chinese club, a Chinese theatre, and a Chinese benevolent society in Lima and Callao; and altogether these

people are making their way in the land of the Yncas, where their prospects are certainly better than in the British and French West Indian colonies. Nor are they ungrateful to the Peruvian authorities, under whose protection they have thriven. On the 2nd of last August a number of Chinamen, in the name of the numerous colony of their compatriots, settled in Peru, presented an address to Don Manuel Pardo, the President of the Republic, on occasion of the completion of the second year of his term of office. They allude to the guarantees and equal rights which have been secured to them, and to the protection they have received; and warmly express their gratitude to his Excellency's Government.

This address of the Chinese emigrants in Peru is a sufficient reply to the misrepresentations of the Aborigines Protection Society, which have recently been published.

The abolition of the contract emigration of Chinamen from Macáu by the Portuguese Government, and the provisions of the new Treaty between China and Peru, will place emigration between the two countries on a thoroughly healthy and satisfactory footing. The essential point is that emigration should be watched and regulated, in every stage, by the respective Governments. All grounds for complaint are now removed; and the Peruvian Envoy in this country is able, in preferring a request to the British Government that emigration may also be permitted between India and Peru, to undertake that all the provisions for the protection of emigrants, which are contained in the conventions with France and Holland, will be scrupulously observed by Peru, if a similar convention is agreed to between Great Britain and that Republic.

Several natives of Hindustan, after serving their contract time in British or French West Indian colonies, have found their way to Callao and Lima, and are well satisfied with their reception. Their success will probably attract others: and there can be no doubt that, in the warm valleys of the Peruvian coast and in the montañas of Chanchamayu, the natives of the over-crowded districts in Bengal and Madras would find a climate and employment well-suited to their constitutions, and considerate masters in the proprietors of the *haciendas*. If emigration is to be encouraged in India, the surplus population will find no better country in which to seek new and more healthy homes than the land of the Yncas. The Peruvian Republic has always scrupulously fulfilled its financial obligations, and her Government has consistently and at last successfully sought to introduce a humane system of emigration. Under the presidency of a statesman such as Don Manuel Pardo there is every guarantee that the provisions of treaties and conventions that may be entered into, will be fulfilled to the letter, and that emigrants, while once more restoring wealth and prosperity to the glorious land of the children of the Sun, will find for themselves a cordial welcome and improved conditions of life.

CLEMENTS R. MARKHAM.

THE NEW GUANO DEPOSITS OF PERU.

IN our numbers for April 1874, p. 35, and June 1874, p. 121, we announced the discovery of large deposits of valuable guano on the southern coast of Peru. This great source of wealth has been thoroughly examined, in the course of the present year, by two civil engineers employed by the Peruvian Government, MM. Thierry and Hindle, as well as by Commander Cookson of H. M. S. 'Petrel'; and the guano has been analyzed by Don Antonio Raimondi, the eminent Peruvian chemist, as well as by Professor A. Voelcker on the part of the Royal Agricultural Society. The results have more than fulfilled the most sanguine expectations.

The first important deposit, commencing from the south, is on the north point of the table-land which extends to the river Loa, forming the boundary between Peru and Bolivia, and only a few miles from that stream. The place is called Chipana, and is in latitude 21° 23′ S., and longitude 70° 19′ W. The surface is smooth, and covered with a slight layer of sand, under which is a hard salty crust overlying the guano. The quantity is estimated at 89,439 cubic metres. Next comes the deposit at Huanillos, an elevated cliff in latitude 21° 15′ S. and longitude 70° 8′ W., which Captain Cookson estimates at 900,000 tons. Pabellon de Pica is an immense cone, rising out of the sea to a height of 1000 feet, with its slopes formed by guano deposits. It is in latitude 20° 58′ S. The quantity here is estimated by the same officer at 4,500,000 tons. Thus, the three newly-discovered deposits of Huanillos, Punta de Lobos, and Pabellon de Pica, in the province of Tarapaca, consist of 7,400,000 tons of guano of good quality. Señor Raimondi, in his analysis, reports the Tarapaca guano to be powdery, very dry, and superior to the Chincha guano, owing to the quantity of ammonia it contains, combined with a larger proportion of soluble phosphoric acid. Professor Voelcker also found the sample to contain nitric acid.

The great deposits on the Chincha Islands, which were used by the coast agriculturalists in the time of the Yncas, are now nearly exhausted. They have been worked for the European markets since 1846. In 1851 the amount of shipping which loaded at the Chinchas represented a tonnage of 191,000; from 1851 to 1860 it was 2,860,000, and the yearly mean during that period was 286,000 tons. Between 1853 and 1872 there were 8,000,000 tons shipped from the north and middle islands. The Chincha Islands ceased to be worked for export to foreign countries in 1872, and now only Peruvian vessels load guano for use in Peru, at the northern island, where there are still believed to be 150,000 tons. In 1873 the north island was visited by 35 Peruvian vessels, which shipped 11,634 tons. The population of the three islands was 6000 in 1868. In 1874 there are 105 persons on the north island, and none on the others.

The exportation of nitrate of soda from the ports of the province of Tarapaca is increasing every year, and forms another great source of Peruvian wealth. In 1830 the quantity exported was 18,700 *quintals* (a *quintal* = 100lbs.); in 1840 it was 227,362 *quintals*; in 1850 it was 511,845; in 1860, 1,370,248; in 1870, 2,943,413; in 1873, 5,768,741; and the whole quantity exported from 1830 to 1873 has been 50,173,729 *quintals*.*

* See *Ocean Highways*, December 1873, p. 385.

The value of the newly-discovered guano, apart from the great saltpetre deposits, is enormous. The 7,400,000 tons, at the moderate price of 7*l.* 10*s.* a ton, are worth 55,500,000*l.* The national debt of Peru amounts to 35,000,000*l.*, so that the guano alone is a solid guarantee to the public creditors for more than the sum total of the whole debt, a guarantee such as no other State which has raised a loan in the European money markets, has ever offered before. Peru has punctually met her engagements during a period of 30 years, and her credit deserves to stand high, both on account of her probity and of her extraordinary resources.

SIGN-POSTS ON OCEAN'S HIGHWAY.

THE BIRTH OF DUST.

CHAPTER II.

"He hath founded it upon the seas, and prepared it upon the floods."

"Let the waters under the heaven be gathered into one place, and let the dry land appear, and it was so."

WE head this chapter with those words, not only because they belong to the Bible, upon which so many of us Dusts love to rest, but because in the course of a reasonable long life, and a tolerable acquaintance with the works of nature and the books of man, we have never met words which harmonize so well with the actual results of the great cosmical laws, or which convey so clearly to the mind the forces, their actions, and the materials that must have been employed, surely but slowly, preparing for the birth of dust. The long-expected event excited much attention; a great deal depended on it; all the elements were required to attend, all were obedient to the requisition; Old Time, with his virgin scythe, superintended the preparations of the whole.

We have said, and we repeat it, that the dusts have nothing to do with the beginning. Solomon told us it was "unsearchable." Professor Tyndall, the latest authority on the subject, told the British Association at Belfast, that "all we see around us, and all we feel within us, the phenomena of physical nature, as well as those of the human mind, have their unsearchable roots in a cosmical life." We hope to comprehend some of the so-called phenomena of nature; but the root must remain incomprehensible. Look where we will, think how we may, both senses find the horizon utterly undefinable. The deepest science of the present is no nearer the mark than Solomon was.

It is far within the limit of that horizon that we look for the birth of our ancestor. Long previous to that event heaven and earth were created; the waters were divided by the firmament. Light and darkness made the day and night. The second day, that comprehensible measure of incomprehensible time, had passed away; two measures of eternity had run out; all that was done in those measures was done by law. Those laws gave direct proof of supremacy; they were infallible; they have continued from eternity till now. The three elements affected by the laws—earth, air, water—were from the beginning; each of them was composed of, and divisable into, many parts; each part, and the whole, were amenable to the laws. The heavens around these elements, with all the hosts of suns, and moons, and stars, all moving, all at vast distances from one another, all occupying infinite space, were and are subservient to these laws; each performs his duty, each fills his cycle, all are under one control, the Creator, our God, the "great first cause," so little understood.

As the winds and the waters move now under the influence of cosmical laws, so must they have moved from their beginning; as the earth submits to their forces now, so must it have done from the time they began to move. The earth allows the permeation of air and water, while the latter compresses it; and air compresses both in its never-ending embrace of love, of light, and of vitality.

Under the united influence of the three elements, the preparations were progressing beneath the floods; the foundations were at the bottom of the waters. In the third day of God's eternity "the waters under heaven were gathered into one place, and the dry land appeared"; at that moment this great cosmical mother produced little dust.

Looking at ourselves to-day, we know that we come from something; something, therefore, existed before us. What that something was is of no consequence just now; we will claim our heritage presently. We must consider the manner of the birth, the locality does not concern us.

We see that atoms, or molecules, as some delight to call them, settle down in quiet places from a dance in the sunbeam. Before the sunbeam days, we danced in the light; as long as the air sustains us in motion we dance. When the air is still, we rest according to our varied conditions. At this present moment we see ourselves on the table, the books, and the ink-stand; if we were not carefully removed daily, we should soon bury them, as we buried Tyre and Sidon. As the air moves, carries, and disposes of dust, water may do the same; but the atom, or molecule, which is capable of forming dust out of water, has to change its condition before taking its place in our family circle; so that we must look at it first in its damp condition, in combination with the forces to which it is liable.

We presume that the first water rested on earth. When the waters were moved, the bed was eroded: the atoms so eroded were as liable to the forces of the water, as dusts were to the forces of the air. They were moved along as drifts; they were carried off in suspension or borne along in solution, they subsided in quiet places, they sunk under the law of gravitation, they stopped for want of force to move them, or some obstacle prevented further progress. We can see similar actions going on in our seas and our atmosphere to-day. As our drifts, our mud, and sand-banks grow now, so they must have grown from the moment that the waters moved away matter from their bed.

Vast regions of the ocean bed are now disclosed to us by the elaborate reports of Captain Nares, of H.M.S. 'Challenger.' He finds that "the rocky nature of the bottom indicates a considerable movement of the lower stratum of water." In one place "the sounding-rod was filled with decomposed rock," which was evidence of the process of erosion. Red coral was found, at a depth of 80 fathoms, in the Atlantic, with a temperature of 52°, the same as on the coral beds of the Mediterranean. These growths

indicate a comparatively quiet sea. Coral mud was found at a depth of 2450 fathoms, telling of erosion and removal. Diatom and globerigina ooze-beds were found at great depths, proving a sinking by gravitation; clay and mud, of varied sorts, at varied depths, proved long-continued trituration of soft materials. Sand, gravel, stones, and rock, found at smaller depths, all indicated currents of varied forces, all laden with materials of varied sorts. The dredge showed that occasionally various deposits were going on at the same time, due to change in the force of currents, or to changes in the material liable to the currents. We have thus the most satisfactory confirmation of constant motion in the waters, constant erosion of their bed, and constant removal of matter from one place to another.

We are bound to take another view of these actions for the purpose of discovering, as far as we are able to do so, the nature or condition of the atoms liable to them. There was a time when the movements or the circulations of the water were without control; when there was no dry land to bid the waves "be still," when the currents met with no interruption, except from the inequalities of their own beds, inequalities which they had made. It is of no consequence here whether the circulation was caused by the varied gravity of the waters, by the expansion of the warm, by the contraction of the cold, by the influence of the winds, or by cosmical motion; we know the circulation exists now, and we may safely assume that there were currents that had a free passage from the equator to the poles, and from the poles to the equator.

On what material did these cosmical forces work? Man has divided what he knows of the strata in the earth into systems, groups, and epochs. The last epoch called the azoic, or lifeless, contains the group of gneissic and granitoid schists, under the so-called metamorphic system. These schists are found in stratified condition as water sediments, on the tops of the highest mountains, on the level earth, and at the lowest depths to which man has explored. There is no reason why these schists should not have been deposited at or about the same time; it is of no consequence to our history whether life did or did not exist in that epoch; but the errors of teachers of geology are of some consequence. Mr. Page tells our schools in his Text-book, "we see clearly that a change has taken place in the original sedimentary character of the strata, and that which at first consisted of water-worn débris—as silt, clay, and sand—has now been converted into a hard shining and crystalline rock." The conversion is supposed to have been brought about by heat. It did not strike Mr. Page that silt and clay belong to epochs of vegetation, and life, so that they need not have been expected in his azoic formations; while azoic times must of necessity have produced hard shining crystalline unfossiliferous rocks, in which the only change that has taken place to our knowledge is the natural change similar to that which takes place in chalk and silicious loam deposits; in these the silex leaves the loam and chalk, forming silicious nodules. In the harder rocks this silicious matter runs into lines, masses, and crystals; no heat is required for these changes, they are inevitable where liquid silex exists. As no human being ever saw these rocks in any other state than they now are, we reject the word metamorphic as fabulous, and go on with our history.

Here and there on the earth's face we find these silicious schists; on our sea and river shores we find sand in all conditions of purity and impurity. In all conditions sands are the remnants of the hard silicious rocks, no other material forms into pure sand, no other material is so indestructible. It is generally allowed that these schists are "primary" formations; if they are, they formed the old water-bed, and hence the erosions from that bed, when redeposited by water, assume a sedimentary character very similar to their parents. If our schists are not primary, we may place them in the second place, as triturated remains of the primary silicious water-bed. It is to this water-bed that we look to, as giving up the atoms required to build banks and shallows in those lifeless days; for as these spots are formed now they must have been formed then. Looking at their tolerably pure condition, we see that there was little else to make them of, except that pure water-bed from whence fragments must have been broken off. They must have undergone trituration, and rolling up the vast slopes of the uncurbed water's bottom, they must have been worn into the very condition in which we find them—hard grains in a hard shining rock.

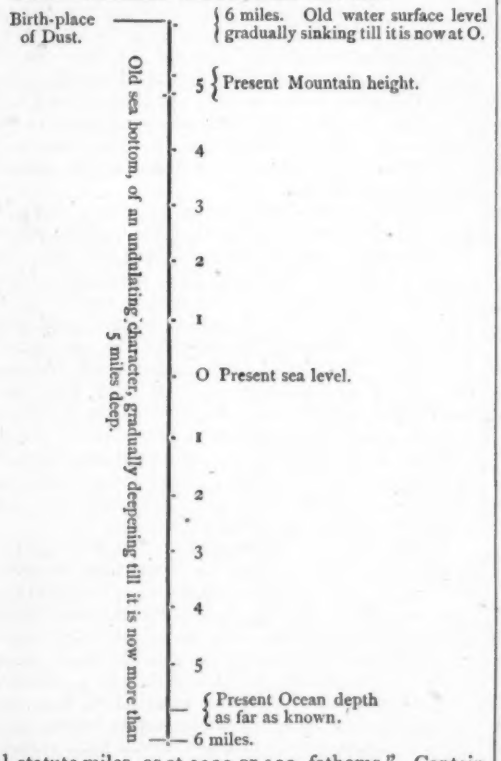
So far then we have prepared the foundation for the birthplace; the purest material was sent to the front by the urgent currents and never-resting waves; countless numbers of minute atoms rolled along, every moment becoming more and more, finer and finer; while still behind them fresh materials were handed on; the shallow places were getting shallower, the deep places were getting deeper; and we approach a subject of which no reasonable explanation has yet been given. How were the waters gathered into one place, and why did the dry land appear?

When we look at and understand the results of natural laws we find them so beautiful, so harmonious, all tending to one end, that as parts and parcels of those results we cannot but glory in the supreme prescience, which created the beginnings of those laws, under which such great events occur. The birth of dust is too momentous an occasion to enter here into arguments with man. We are contemplating this globe as a cosmical mass, composed of three elements, forming a wondrous trinity, uniting in all its parts in obedience to those laws, under which each part came into existence, their incomprehensible beginning. To enable us to comprehend the law that we allude to, to watch the obedience of each element, and see the results, we use a simple diagram (see next page), as a comprehensible measure of actions, going over incomprehensible time, and extending over cosmical space. It shows us the present level of the surface ocean at O—the present depth of the ocean between 5 and 6 below, and the present height of the mountains, between 5 and 6 miles above the ocean level. These are all the points we refer to at present, but they will be referred to again.

There are two ships engaged at this moment in examining ocean depths—the 'Challenger' from England, and the 'Tuscarora' from America. Commander George E. Belknap, of the latter, reports under date June 26th, Japan, (the *Times*, 2nd September, 1874):—"When about 100 miles east by south from Kiraghassan, or Sendai Bay, on the east coast of Japan, the lead sank to a depth of 3427 fathoms,

showing a descent of 1594 in a run of 30 miles." In the next cast, at about 45 miles distant, the sinker ran out "4643 fathoms, without reaching the bottom. . . . On this occasion, when some 500 fathoms of wire had run out, the sinker was suddenly swept under the ship's bottom by the strong under-current." In the Japan stream he found 3493, 3587, 3507 fathoms, and in the next cast the sinker was not detached till it had descended "to the extraordinary depth of 4340 fathoms." In one of the next six casts "4655 fathoms" were found; and, says Commander Belknap, "I have no hesitation in saying that the moment of touching the bottom was as instantly and accurately known at 4655 fathoms, or at a depth of more than

DIAGRAM showing the ABSTRACT POSITIONS of EARTH and WATER, in the PAST and PRESENT TIMES, and the POSSIBLE BIRTHPLACE of DUST.



5¼ statute miles, as at 1000 or 100 fathoms." Captain Nares remarks on the section between Bermuda and Sandy Hook:—"The soundings show that there is a remarkable hollow, 3875 fathoms in depth, immediately north of the Virgin Islands." In other places in the Atlantic Ocean he found bottom at 3000, 3025, 3150, 3827, and 2600 fathoms, between the Cape of Good Hope and Melbourne; but the currents were frequent, in one place "the stream rushing past as in a mill-race." The deep places are called troughs, gullies, and channels, according to their character, and there can be no doubt but that they have been excavated by the constant action of water currents; so that as river streams excavate channels, gullies, and troughs, the same result has followed the action of waters on the sea-bed; this bed has then, in one part or another, been continually getting deeper, while in other parts it has been continually getting shallower.

These results are followed in the two elements, water and air, by similar actions; they are both expelled from places where deposits take place, and they occupy places from which materials are removed, so that they are both constantly encroaching on or retiring from some place or another. As these actions have been going on for an unlimited period, and as the currents have maintained their cosmical characters all through their epochs, from their beginning till now, we may assume that the ocean beds affected by these currents are deeper now than when these actions first began. Man has been rash enough to suggest measures of cosmical denudation; but as the denuding forces are never equal, and never act on equal substances, we reject these measurements as unsound, contenting ourselves with remarking that the present mountain height of 5 miles must be less than it was. If, then, the height of the mountains has decreased, and the depth of the sea has increased—as the sea level, once covering the whole, has retired from the mountain tops to its present level, a distance of 5 miles, we have a reciprocity of action between these measurements, which lead us to our conclusion. There is, however, a complicated elemental action that we must notice before we can reach the point we aim at.

The currents of air and water are not continuous; there are regions where the winds blow from one direction during a part of the year, and from a contrary direction during another part. These aerial currents affect the waters, and their surface currents unite with the winds in the duties before them. In some regions the winds are too variable to affect ocean areas of any extent; though the waters may occasionally be heaped upon the shores, or be driven from them, their action is not continuous. These variable currents, as well as the persistent ones, arrange the balance of cosmical power, and though the forms of land may influence the water and the air, we must not forget that the cosmical configuration of land was due to the continuous, or to the variable conditions of air and water. We have then a great variety of surface shape to consider, all depending on the conditions under which they were formed. We have small and large mud and sand banks; we have them of every possible shape; we have long, gradually sloping shallow places and abrupt precipices below water. Those banks that have been washed up in one year may be washed away in another; while the great currents go on for ever in their season routine of duty, and slowly gather together all the materials placed at their disposal. Under the action of the constant and inconstant elements, this surface earth is now what it is. We have said that the locality of the birthplace is of little consequence to us; we claim the first cosmical dry land wherever it was, but there is a locality that offers an example of the vast labours, and the vast accumulation of atoms. This locality may have been that selected. We will dwell upon it for a brief space, perhaps it will bring us pleasantly to our goal. The region we allude to has its centre in the Himalayan mountain range, extending to Samarcand on the north-west, to the equator and Siam on the south-east. The centre of this long irregular barrier rises some 27,000 feet, about 5 miles above the present ocean level. Far away from the site of

these mountains the southern waters now plunge against the shores of Hindostan; far away to the north and east the northern waters wash the shores of Siberia, Kamschatka, and China. The north-east monsoon still reaches Hindostan from these regions, and the south-west monsoon is still felt in the Himalayas. Long before any of these regions were dry land, the currents of wind and water had unbounded sway; they met upon the site of these high lands, and they are the certain result of a comparative quiet locality between these yearly monsoons. If the 'Tuscarora' and the 'Challenger' had sounded here at the beginning of the third day of creation they would have found shallow places, with the shallowest of all where Ghaur-Shunken, the source of light—now Mount Everest—and Dhawaligheri, or the circle of light, now raise their snowy heads.

All through the two first days of creation the seasons were as regular as they now are; the whole mass of dust beneath us testifies to the fact. The winds blew, and the ocean moved; both of them gathered spoil by the wayside, and both dropped it where it was wanted between the great cosmical currents. During all that immeasurable time, the atoms came rolling into the trysting-place before the cosmical agents; all along the undulating ocean bed they travelled on slowly but surely; smaller and smaller each atom grew, handing over every moment to the water solutions some of their lighter materials, and purer and purer grew the myriads of atoms. As they rolled on, they filled the places of those that had gone before, and as the solutions fell in with quiet corners they also subsided in their masses.

In the midst of the great area alluded to there were seasons when the winds ceased to blow, and when the waters were at rest, when light ripples took the place of waves, and light zephyrs took the place of the monsoons. The zephyr and the ripple dallied with the silver sand; their tiny efforts were still exerted in arranging and purifying. Still the glittering atoms rolled up and rolled down again; still the slumbering wavelets kissed each other, and the bright spray flakes sparkled up between them, to whisper to one another of the coming day.

Reader, have you ever stood upon a glistening sand in summer time, when the pellucid sea-wave broke in crystal purity on the gentle slope, washing up the brightest atoms to your feet? have you ever watched those atoms of hard silicious matter settling down, as if weary of their travels? and have you heard the sigh of contentment from the sands, as the hurrying waters retreated from their labours? If you have, you will comprehend the scene which took place in the Himalaya region many millions of years ago, at the commencement of man's third measure of time. There was a cosmical harmony in the scene, as wavelet after wavelet broke over the site, retiring, and still retiring season after season, from the barrier themselves were building. Higher and higher that barrier grew; weaker and weaker grew the water force as it wandered in growing uncertainty up the glittering slope; fewer and fewer flew the spray-flakes; more and more distant broke the surf-wave; deeper and deeper sunk the ocean-bed; quicker and quicker the cosmical waters retired to their channels; till at last, along the line of old contention, the summer of peace came on, the sound of the ripples died away, no more the spray-flakes dashed across the barrier. That barrier had been prepared upon the floods, and, founded on the seas, the waters were gathered into one place, and the dry land appeared. The summer breeze stooped down to kiss the first-born dust. Its God looked down from heaven, and saw that it was good.

Far be it from us—Dust—to assert in wilful dogmatism, that this Himalayan site was our ancestors' birthplace: we do not expect any one to say it was not. We record a cosmical fact that took place somewhere, at some time. It was worked out by cosmical laws, which still exist, and still prepare the mud-bank and the sand, and still erode their water beds; but the material washed up is no longer what it once was. Still, in all that the ocean leaves behind it, silicious matter will be found mixed with the refuse of to-day. All that is heaped up now is supplied by the waters: it is not all eroded from their bed, but before growths and lives were created, there was nothing to work up but the triturated fragments of the old sea-bed. In the present, in the past, all that was heaped up was equivalent to what the waters moved, and consequently what the waters heaped up of old was equivalent to that which they borrowed from their bottom, while every atom taken from thence contributed to the cosmical deepening of the sea.

We now return to our diagram, page 373. We place the original surface water-level higher than the present mountain tops, not only because these tops were once under water, but because they were once higher than they now are. As the waters rested on the highest parts of the banks which were formed under their surface, those parts were for the time part of their bed. As this bed has been deepening ever since the waters moved upon it, that bed must have occupied at various times the whole of the space from 6 miles above to its present depth. As the troughs, gullies, and channels are deeper now than other parts, so from the first there must have been an undulating bottom, deeper in some parts than in others. The diagram explains the abstract condition.

Under this view of the events that took place in man's third finite measure of infinite time, the waters remain now in the same condition as to quantity as they were then: nothing is lost. The firmament still divides the waters above from those below, their mutual connection is still maintained by a continued process of reciprocal exchange. This exchange is cosmical. The waters below supply the atmosphere, the atmosphere supplies the earth, and its surplus bounty carries away to the ocean all of earth that it finds available, the entire process evincing a supreme power of prearrangement of laws, of love and harmony, that of themselves are sufficient proof of one first great initiating cause, as well as visible proofs that this cause continues. We have ventured to explain some of the actions depending on this supremacy; man can see them in their working condition. There is no cosmical rest, no cessation of the atmospheric movements; the ocean currents never stop, and earth, our wondrous mother, is always passive.

Little more remains to be said. We contemplate the scene before us; we see the glittering dust nestling beneath the summer breeze, ready to obey the first commands. Near this brilliant group, Old Time with his venerable figure sits upon the sands, feeling the edge of his polished scythe. The vista is a long one,

but we, the despised dusts of the present, wish to claim our heritage. That minute atom our forefather has handed down his glittering purity to us; we inherit his indestructibility and his ubiquity. M. Delesse has just shown us, what we knew before, that we are to be found in all present ocean deposits. We see our glitter in the rocks, on our footpaths, in our fields; we see it in the structure of the water growths; it forms the clothing of the grass, and shines on the highest leaf of the tallest forest tree. The microscopical growths of the waters, those fair links between the animal and vegetable worlds, use us for their habitations. We are lustrous on the feathers of the bird, on the scales of the fish, on the hair of the animal, and the animal man converts our silicious materials into crystal palaces and domestic uses, by purifying us from the impurities of the earth. We were, then, in existence before all this was done. We claim our heritage from cosmical creations, the water, the earth, the atmosphere, and from their beginning, the unapproachable, the infallible great first cause. We claim to be still guided in our way by that light; and as we wander with a faltering step into the labyrinths that we ourselves have formed, we try to read each sign-post as we go. Man in his impatience has lost the clue, and has not read those signs; but he has lit up many beacons to guide the present and the future from the rocks, and the shipwrecks of the past. We cannot descend into the *minutiæ* of life and growth; we go on with the great cosmical movements. In doing so we hope to throw a light upon present shades, and to prove the truths of our postulates. The waters gradually retired into their own depths. By this retiring of the waters the dry land appeared. On the appearance of dry land dust was produced. Or in the words of our heading—"let the waters be gathered into one place, and let the dry land appear, and it was so." If any one can prove it was not so, and can point out another reasonable cause, with cosmical laws for the birth of dust, we will gladly explore the new path. Till this is done, we shall hold by the system we have here sketched, and say The Birth of Dust is a reality.

H. P. MALET.

IMPRESSIONS OF JAMAICA.

CHAPTER VI.—A VISIT TO GOVERNOR EYRE.

EARLY one morning, by directions given over night, I was summoned out of slumber by Tom, a lad of exceeding blackness, who had engaged me in the capacity of master almost immediately on my arrival at the port of Kingston. Through the light veil of the mosquito curtains the room looked strange to my suddenly awakened sight. But having roused my senses to the recollection that some weeks had elapsed since I had retired to rest in Radley's Hotel, Southampton, and that during this interval I had travelled to a land in which glass windows, marble chimney pieces, carpeted floors, cushioned squabs and couches, down pillows, and quilted coverlets were happily unknown, I drew aside the protecting gauze, and descended from the lofty elevation of my mattress to the boards redolent of bitter orange-juice and gleaming with the labour of household hands. Not, however, without carefully investing my feet in the slippers providently placed at the bedside! For the chigoe, or "jigger," as that unpleasant insect is more commonly called, lies in wait for the unguarded step, especially of Europeans. This exceedingly minute and troublesome flea, or tick, named by naturalists *pulex penetrans* by reason of its entering the skin—generally choosing a tender hinge under the toe—is one of the natural curiosities of the Antilles; and I confess with something like humiliation and regret that my great caution was effectual in preventing me from obtaining a personal experience of the creature's habits. I remember to have heard, when I was a boy, of somebody who was as proud of something as he had been "of the first jigger he got in the West Indies." Perhaps it *is* a thing to be proud of, though not to thank heaven for. One of my English friends, a fellow-voyager by the 'Atrato,' attained the honour and glory which I missed. But on the whole I may be satisfied with having enjoyed the privilege of seeing him operated upon. The chigoe buries himself between the epidermis and cutis; and a delicate skill is required to dislodge him. It is a skill, however, which almost every negro who has reached the years of as much discretion as he is likely ever to possess, will have acquired by practice. Tom, already mentioned as having done me the honour of permitting me to pay him wages, was a sufficiently expert hand at jigger-drawing. He was the operator in that case to which I have alluded. His instrument was a fine needle, the point of which he tried many times, and with great care, on the open palm of his own hand. Then dropping on one knee, he took on the other my friend's afflicted foot, and gently tightened the skin on either side the tiny entrance-hole made by the chigoe, using for the purpose the thumb and forefinger of his left hand. Then, with many cautious touches of the needle-point, as if he were stippling a very fine miniature, he extended the orifice; the extreme delicacy of his work being testified by the fact that, tender as was the part on which he operated, my friend could not feel any pricking. A great danger has to be avoided in thus getting at and removing the small enemy. If he is not fetched out whole, ten to one the particles left behind will be a cause of grief far greater than any that the sound unbroken insect would of himself be able to inflict. Perhaps it is not *he*, but *she*, that has entered on possession, like a determined squatter. In that case, look out for eggs, and a multiplication of jigger-torment! But the negroes are so careful and dexterous that any bungling in this business is of rare occurrence. The result of such miscarriage in chigoe extraction would be a poisoned ulcer, terribly painful, and hard to cure. The chigoe, by-the-bye, is white, and, therefore, the more difficult of detection when buried in a fair skin.

Fortified by a cold bath and a hot lobster, which locustan luxury in the tropics differs nowise from the same species of crustacea caught on Scottish and Norwegian coasts, I took my seat in the slender buggy which the Creoles of Jamaica have borrowed from the United States. It was barely six o'clock when my active ponies were trotting up the sandy slope by which we left Kingston. I was going up hill to the extent of 4000 feet that morning, but not in the buggy. Wheel-traffic in that northern direction ends at The Gardens, or rather at the store and posting-house, then kept by a Mr. Lazarus, in the vicinity

thereof. Jamaican Creoles are proud of their roads. Even those of the low grounds, which cannot but be sandy, are kept in as good condition as is possible, gangs of "hard-labour convicts" being chiefly put to this kind of work. Those very black gangs, working in fetters, under the guard of a single armed warder, himself a negro of the deepest dye, had a strangely grim appearance in my eyes, and I must confess to having read with astonishment in Mr. Sewell's generally faithful account of the British West Indies that the "hard labour" in their case is something very like a farce. In the Penitentiary it may be that the peccant negro has a rather easy time of it, but, certainly, the convict forced to work at road-making, with those irons about his tender shins, looks very far from being the blissful creature of Mr. Thomas Carlyle's painting, with his "beautiful black muzzle" buried in pumpkin. It is possible that, being on the open road, he has now and then the opportunity of exchanging a grin, or, perhaps, a familiar word with some free and light-hearted George or Jemima of his acquaintance, passing to or from market. But according to such observations as I was able to make, the hapless road-mender was much too sulky for habitual communings with the world at large; and I saw not a sign of that playfulness and that gay greeting of passers-by which would seem to have struck Mr. Sewell as he watched the conduct of these interesting felons. Perhaps a more stringent code of regulations for the discipline of the convict road-menders may have been introduced, in the period between the publication, by Messrs. Harper, in New York, of Mr. Sewell's valuable book—written, by-the-bye, from the American stand-point—and my visit, two or three years later. I never passed a gang of those ill-looking savages but they were glum and speechless. I never saw one of them bestow a glance from his hated work, but that glance was a scowl. The guard and overlooker, in his white Osnaburgh suit, with a Colt's revolver stuck in his belt, stood like a watchful sentry as he was; his black face settled to that stern expression of a sense of high official importance which the negro is apt to assume when a public trust of any kind is reposed in him. He did not seem, I thought, by any means the kind of man to allow prisoners in his charge "to stop and talk to girls, and amuse themselves in any manner they liked." Such indulgence from a negro in authority to negroes in subjection to his command, would indeed be a strange contradiction of all ordinary experience touching the African character.

The commonest and most serviceable hedges on either side, where the road lies among grazing pens, are formed of the tall cactus known in Creole parlance as the dildo. This class of succulent plants is remarkable for vitality and spontaneous growth. The usual way of making a fence that shall become in very quick time a perfectly impassable barrier against cattle, is to chop up a certain number of dildoes into lengths of about 18 inches or 2 feet, and to lay these truncated segments loosely in a row, leaning against a sloping bank of earth. Without further tending they take firm root, and quickly grow to a height of 14 or 16 feet, throwing forth strong sharp spines laterally. Penguins and other kinds of cactus abound in the hedges and by the road side; and you may see on all the broad oval-shaped blades of this fleshy order of plants, rough white spots that look like splashes of lime. These excrescences are the envelopes of the cochineal insect, which fastens and fattens on the thick flat leaves, if leaves we may call them, that are truly but the stem itself taking leaf-like shapes. I have picked off the white warty blotch and crushed it; when instantly a stain of the purest and most delicate crimson-carmine was produced. Could not this be made a source of profit, by means of a little industry? I put the question to an intelligent planter, who returned for answer the words, "Yes, surely; but that would imply rather more sense than we have in Jamaica."

The stranger travelling along these well-made highways will have almost as many chances of being attracted, interested, and perhaps puzzled, by novel objects of nature, as would peradventure befal him in the forest or on the wild mountain pass. I call to mind at this moment the huge masses, seemingly of dry mud, attached to and sometimes encircling the trunks and large branches of trees. Seeing for the first time these immense projections, varying in size from a nine-gallon cask to a hogshead, on trees very near Kingston, and close to the high road, my pardonable mistake was the conjecture that they were the work of human hands—perhaps some rude tropical method of grafting, or setting the broken limb of a tree, as in England I have known the main branch of a large mulberry-tree replaced after its detachment, and patched up with clay. Having the curiosity to examine one of these bulky protuberances, before I knew what it was, I found that the material was indeed earth, that the outside was very crumbly, but that, penetrated to the depth of half an inch or less, the substance was hard, as if a fine sort of loam had been kneaded with gelatine or glue, and left to indurate with time. Here also appearances were borne out by fact; but had I pursued my search more keenly I should have broken through the outer wall of what was in truth an ant's nest; should have laid open the interior of a mansion of many halls and corridors; and should have seen that the material of the building was harder and denser than the wood of the tree to which it was attached. There is no part of the nest, I am told, that is not honeycombed with chambers and passages, the floors, walls, and ceilings of which are as close-grained and tough as a coach-panel, and of about the same thickness, though made of a glutenized earth instead of seasoned timber. I saw no ants, nor the trace of any, when I made my superficial examination of their abode; and the nest in question may have been a deserted one. But at the same time it is worthy of note that the particular tribe of duck-ants that nidificate in this wonderful manner live an indoor life, and are so much given to working under cover that even their approach to the house or city, as we may call it, is by a shaft or vertical gallery extending along the bark of the tree, from the nest to the ground. The industrious little fellows will even build a tubular gallery, of considerable length, for some temporary purpose, knowing, as their instinct must teach them full well, that its exposed situation—across a roadway, for instance—renders it liable to speedy destruction.

There is a chameleon in Jamaica, but the ugly saurian thus designated is, oddly enough, considering his reputation, less in the habit of changing colour than any of the large and beautiful lizards. One of

these astonished me greatly: and had it not been that I was afterwards in company of an old resident who bade me watch one of the same class of reptiles, and who observed with me its remarkable faculty of suiting its hue to the ground on which it stood, I should, at this distance of time, hesitate to record a fact which, to many persons, will seem like the outcome of an unduly excited imagination. The phenomenon has, however, been certified by the testimony of approved naturalists, as well as of casual and unscientific observers, and I have no just cause to withhold my fragment of evidence, which is this:—As I drove that morning on the road from Kingston to the Gardens, a large lizard crossed the road in front of my horses—so near that I stopped them and turned in my seat to look back at the creature, not being sure of his having escaped the wheel. He was quite safe, however, and he lay basking on the grass by the roadside, lazily and fearlessly looking at me, while I continued, with the rudeness of an English traveller, to stare at him, a native. It struck me, even then, that he was not the same in colour that he had been when I first caught sight of him as he crossed my path. He was now as green as a lizard is generally supposed to be at all times—perhaps a trifle greener—and in fact pretty nearly the colour of the grass. Suddenly, he glided to the top of a large stone, whence he resumed his attentive study of my features, even as I—to the great trial of Tom's patience, no doubt, as that intelligent and affable young man and brother sat by my side in the Blundle Hall posting carriage—still kept the ponies standing, that I might look a little longer at the lizard. He had not been more than a minute in his new position before he was of the same grey hue as the stone itself, and might have seemed a sculptured part of it. I felt the half impulse to take into my wondering confidence the black boy at my elbow, and to question him touching the natural history of the Protean reptile. But I restrained this desire for instant acquirement of knowledge, partly by reasoning with myself that Tom, from all I knew of him, was as unpromising an authority on subjects outside his domestic curriculum of clothes-brushing, boot-cleaning, horse-grooming, and jigger-drawing, as any hanger-on of Blundle Hall, and partly, also, by yielding to the same *mauvaise-honte* which kept me for a long time from inquiring into the economic philosophy of the ants' nests. The lizard was in no hurry to move from the sunny stone; but when at last he did so, it was with a view to recrossing the road obliquely towards the spot whence he had emerged when first I saw him; and most certainly before he had reached that spot his colour had changed to a dull earthy brown or drab, the same as that of the road, or of the ground-doves that pass half their lives in running for miles at a time in front of the horses in Jamaica. Here I have introduced another topic of the highway. The ground-dove is a bird that has distant relations in sub-tropical as well as tropical countries, and I saw an Australian specimen, dead, the other day, having just killed himself by flying against a pane of glass in the house of Mr. Bartlett, of the Zoological Gardens. But the Jamaican ground-dove is a pigeon with attributes which, if not entirely his own, are yet his in an eminent degree. He is very small, and he is as good at running as a red-legged partridge, without any participation in the shyness of that gallinaceous biped. In fact, there is no more sociable bird than the ground-dove of Jamaica, his persistent companionship being almost that of an inveterate bore. I have had a party of his kith and kin running before me for such an unconscionable distance that I have really felt inclined to apologise for taking them so far out of their way without being able to offer them some refreshment.

As you get out of and above the plains, and can gaze down upon Kingston's port and harbour—which you will be able to do with a sidelong glance, instead of by looking back, for the road has taken a turn almost at a right angle with the direct ascent out of the town—you begin to have a foretaste of the delight to be experienced in a mountain journey. Precipices begin to show themselves, below and above you. There is a glorious rock to which you look up with an admiration divided between it and the beauty of its verdure. Almost on the summit grows, in rank luxuriance, the prolific grass of which all kinds of cattle in Jamaica are fond; and, tempted out beyond a firm footing, by the abundance of this fine pasture, horses and other animals have fallen, and have been, literally speaking, dashed to pieces. Soon, now, we come upon the life of a village, having already passed something of the kind when we had travelled for a time along the ledge that runs parallel with the sea-shore a few hundreds of feet below, and distant perhaps 5 or 6 miles by flight of bird. Now comes in sight the wood-built grocery store of Mr. Lazarus. There are groups of negroes standing pretty idly about the spot, which has steep, palm-clad heights above it, to the left hand of the road where it stands, and an equally precipitous descent nearly opposite. Here, as I have said, wheeled carriages stop, and the traveller betakes himself to the saddle. An alarmingly small donkey was now led forth saddled, and was placed at my service; and Tom, the ponies, and the buggy were abandoned for a day or two, as I was about to become the guest, for so long, of Mr. Eyre, at Flamsted, high in the Port Royal Mountains. One agreeable circumstance which abates the grim terrors of the perpendicular rocks, along which so many of the bridle-paths and even carriage ways of Jamaica take their winding course, is the luxuriant vegetation covering those precipices. Beyond the useful knowledge that there is a fall on this side or that, you may travel with comfortable forgetfulness of danger; there being many objects of beauty, such as palms, plantains, tree-ferns, and aloes, interposing between your sight and the bare, terrible threat of destruction. Nor is the mitigation of dread a matter of appearance only. Many accidents, that must otherwise have been, for a certainty, mortal, have ended either harmlessly or with injurious consequences far less than loss of life; the saving cause being a group of plantain leaves or a mass of ferns. Riders have been fortunate enough, catching by some bough or stem, to disengage themselves from the saddle, while the horse has rolled on, or dropped from point to point, till every bone in his body was broken.

Nothing is stranger to think of, in connection with Jamaica, than the unfounded fears that have encircled its very name. First there is the climate, once supposed to be deadly to Europeans. "The Englishman's Grave" is a name that has been fastened sometimes on the island generally, sometimes on the parish of Vere. The air of Jamaica is now

generally admitted to be salubrious, even on low grounds, when they are drained; while the mountains breathe the very atmosphere of health. Newcastle, 4,000 feet above the sea, is positively the healthiest station for British troops. That is a fact established long ago by irrefragable statistics. Of other visionary terrors, such as of poisonous reptiles and poisonous plants, I shall have something to say anon; but just at present our topic is the climate; and Flamsted, standing on or about the same level as Newcastle, is not less delightfully healthful. My only luggage, on that journey, was comprised in a dressing-bag of unusual size, bulgily packed with clothes, and rendered ridiculously heavy, I am ashamed to confess, by a perfect battery of superfluous silver-topped bottles. When I was told that a girl of ten or thereabouts was to carry this piece of luggage up to Flamsted, I expostulated strongly, representing that its weight was even more than proportioned to its size; but the bare-footed little negress met my objection, practically and decisively, by lifting the great black leathern bag, which, with its contents could not have been much if any less than three-quarters of a hundred-weight, to the crown of her head, where she balanced it with a careless ease wonderful to behold. I thought when I was in Sweden that the Dalecarlian girls and women, especially those engaged in rowing the numberless boats between the islands on which the city of Stockholm is built, were the strongest of their sex; but they are, muscularly speaking, nowhere, compared with the Hottentot and other African races. The habit of balancing every kind and manner of thing on the head, whether it be a chest of drawers or a gallipót, a bale of merchandise or a box of Morrison's pills, is also a notable peculiarity in the negress. When she makes a purchase, however small, she always walks out of the store in triumph, with the article on her head. A small phial of tincture for the tooth-ache —malady most dreaded of the negro race—I have often seen balanced upright on the cranium of the much-suffering patient. Finer exercise for giving habitual grace and freedom to the carriage of the body could not be devised by a fashionable teacher of calisthenics, than this custom of poising objects, the lighter the better, on the head. Lessons in deportment all come short in effect of this first if not only lesson in the negro school of elegance. If, then, ye mammas and governesses, there happen to be a fast-growing, angular, awkward, stooping girl among your brood, who resists all improving precepts to hold her head up, throw her chest out, keep her shoulders down, &c., give her a pasteboard vase, or something that is light, slender, and not susceptible of damage from a fall, and oblige her to balance it continually upright on her head, whether she walk, run, sit, or stand.

Guide and porter too was my small negress, in that toilsome ascent; and I trembled at times for the dressing-bag of Shäfer's ingenious handiwork, which was at once the admiration and the envy of all my European friends and acquaintance, and which now seemed in direst peril of precipitation among the mountain shrubbery and the masked rocks. For the little bearer balancing the bag that rivalled her own face in jetty blackness walked always by preference on the edge of the beetling promontory; and though we presume that Blondin is sure-footed enough for his own safety, still we must all think dubiously of the insurance-policy held by the man whom Blondin undertakes to carry across Niagara. So did I surmise that the little negress knew perfectly well how to take care of herself; but it was by no means so comfortably evident to my mind that her own preservation was identical with the security of my luggage.

Wild, grand, beautiful as was the scenery disclosed by that ascent to Mr. Eyre's mountain-retreat, I was yet to behold panoramic pictures that were grander, wilder, and more lovely. A "painted garden" Columbus called Jamaica; and this image, so suggestive of refined gold doubly gilt, is one which must be ever present to the traveller on that enchanted isle. Moreover, it happens to nine persons out of ten who go to Jamaica, from this side the Atlantic, that an increasing scale of wonders and delight is in store for them. That is to say, they will inevitably land at Kingston, after having coasted that side of the island which is most remarkable for boldness, but which lacks by comparison the exquisite beauty of the northern shore. Then they will gradually make acquaintance with the scenery of the interior, first, of course, with that which is adjacent to Kingston. After having seen something of the Port Royal Mountains, they will most probably proceed to St. Jago de la Vega, now more commonly styled Spanish Town, and will find another and more sweetly picturesque kind of country in the corruptly named "Bog Walk"; ultimately, they may cross the chain of Blue Mountains to the north of the island, and find, amid its pimento-groves and cascades, a marvellous beauty of which their former experience, charming though it was, had given them no conception. This is the progressive order of my Jamaican reminiscences; and I do not doubt that it corresponds exactly with the chain of recollections formed by most other visitors from Europe, to that ignorantly wasted treasure of our West Indian possessions. And it is thus that, in recalling my first mountain journey in Jamaica, I find less to speak of with enthusiasm, because of the subsequent impressions, which were so deep as partly to obliterate those which went before.

On reaching the abode of his Excellency, whose acquaintance I was then about to make, a month or two before his retirement from the island he had governed with so bitterly thankless an effect, I found a home more English than anything I had seen since leaving England in mid-winter; and in this smiling temperate atmosphere, the difference of climate struck me with even greater force than in the hot sandy lowlands, where all surrounding objects were strange. The lady of the household pointed out to me, with cheerful pride, that there were actually English fireplaces in the principal rooms; and though, at the end of January or beginning of February, when the Jamaican year was at its coldest, there were no fires in the comfortable open grates—the temperature being then something like English summer-heat—I was given to understand that there *might* be one or two evenings out of the 365 when a blazing log would be agreeable. Still, the house was on the ordinary plan of domestic architecture in the British West Indies; that is to say, the rooms were on one floor, and branched off from a large central chamber or hall. It was rather in the fittings and appointments than in itself that the dwelling was English. All the furniture, of course, had been carried up bodily from the plains; and, thinking

of the ledges up which I had clambered on donkey-back, I heard, with a feeling of considerable respect for the strength of the negro, that Mrs. Eyre's piano had travelled to its elevation of 4000 feet, on the heads of four men, from the establishment of Messrs. Turnbull and Lee, in Harbour Street, Kingston. Mr. Eyre and his secretary were in the midst of very important business at this time, and were up to their eyes in papers, which were being perused, docketed, and arranged, for production or reference in the Court of the Royal Commission, at Spanish Town. It was an anxious as well as a laborious time for my host; but he received me in the kindest manner; and, throughout my short stay, paid me the most courteous attention. Before dinner on that day of my arrival at Flamsted, Mr. Eyre took me for a rambling walk, in which his love of nature and acquirements as a naturalist were made pleasantly apparent; nor, in that mere appetizing lounge, could I forbear to think of his famous walk, as an exploring geographer, across the Australian Continent. Of his agility, too, I had proof in an act of hospitable kindness; for when I expressed admiration of a large white orchid-bloom which overhung our path, he climbed the rock with the lithe and graceful ease of a mountaineer, and brought me down the flower.

Returning to the Flamsted domain, we dined *en famille*, and in true English fashion. The roasts were saddle of mutton and turkey, a dual fact which is not now recorded without some reason. The oxen in Jamaica, and no less the sheep, are an honour to the breeders and graziers on that island. A stranger will admire most the larger cattle, which are always in magnificent condition; but, perhaps because mutton is just twice the price of beef—or was at the time I speak of—the Creole stock-farmer thinks most highly of the native reputation for sheep-breeding. Fresh meat has to be carried every day from the Kingston market to residences situated, like Flamsted, among the lofty hills; but poultry can best be reared in such spots, and I found that turkeys were an especial boast of the little mountain home of Governor Eyre. Wild turkeys, if not abundant in Jamaica, are yet common enough to denote the suitability of the climate for tame turkey breeding. The garden at Flamsted was the most thoroughly English part of the little estate. Here strawberries were growing, when the young members of the family piloted me about the grounds on the morning after my arrival. All the fruits were English, unless pines are to be excluded, which would be hardly fair, considering that the best are grown, though at a terrible cost, in England. Had the times been favourable for the longer sojourn of a visitor at Flamsted, I should have learned much concerning the natural history and botanical capabilities of Jamaica, from Mr. Edward John Eyre, the explorer of Western Australia, and discoverer of Lake Hindmarsh, who, whatever may be the differences of opinion as to his conduct in the suppression of a black rising on the island of which he was governor for the British crown, must be regarded with admiration as the hero of the greatest land-cruise ever undertaken in the cause of geographical knowledge.

GODFREY TURNER.

(To be continued.)

Reviews.

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ISMAILIA.*

SIR SAMUEL BAKER, the discoverer of one of the great African equatorial lakes, has had the rare good fortune, which is mainly due, however, to his own high qualities, of returning to the scenes of his former exploits, in order to redress the wrongs he had witnessed, and to complete his work. His late expedition was, as he says, the practical result of his original explorations, in which he had been an eye-witness to the horrors of the slave trade. The state of things was so shocking as to excite strong feelings of indignation in any traveller. Many would have been content to denounce it. Baker resolved, if possible, to put an end to it. The Arabs, who had deserted their agricultural occupations in the Soudan, formed companies of brigands in the pay of various merchants of Khartoum. The largest trader had 2500 Arabs in his pay, employed as brigands in Central Africa, regularly organised, divided into companies, and armed with muskets. They occupied enormous tracts of country by means of chains of stations, and wherever they came, anarchy, desolation, and murder came also. Not less than 50,000 slaves were thus annually captured, and either held in camps, or sent down the White Nile, and by the route of Darfur and Kordofan. The loss of life was frightful, anarchy spread over the invaded country, followed by devastation and ruin.

Sir Samuel Baker's expedition was organised to subdue to the authority of the Khedive of Egypt the country south of Gondokoro, to suppress the slave trade, to introduce a system of regular commerce, to open navigation on the great lakes of the equator, and to establish a chain of military stations and commercial depôts, Gondokoro being the base of operations. Sir Samuel changed the name of this place from Gondokoro to Ismaïlia, in honour of the Khedive, and, as that of the principal base of his operations, he has taken the new name as the title of his work.

The intrepid English explorer, to the ill-concealed disgust of the people of Egypt, received the supreme command of an expedition to be fitted out for the above objects for four years, with the rank of Pasha, on the 1st of April 1869. He was accompanied by Lady Baker, by his nephew Lieutenant Baker, R.N., as head of the topographical department, and by a staff of English engineers and shipwrights, besides a force of 1645 Egyptian troops; and in February 1870 the expedition left Khartoum. Baker's military operations, and the political arrangements which followed, are described in these volumes in the talented writer's best style, and with a clearness and vigour which will enchain the imaginations of thousands of his countrymen. The achievement is one of which Englishmen may well be proud; and it is fortunate that among the gifts of the accomplished commander

* *Ismaïlia:* a Narrative of the Expedition to Central Africa for the Suppression of the Slave Trade, organised by Ismail, Khedive of Egypt. By Sir Samuel W. Baker Pasha, M.A., F.R.S., F.R.G.S., &c., &c. With Maps and Illustrations. 2 vols. Macmillan, 1874.

of the expedition is that of describing with his pen the services performed in the field.

The interest of the reader will be sustained throughout, as he is told of the difficulties in the Bahr Giraffe, of the march to Fatiko, and onwards to Unyoro, of the night attack and conflagration at Masindi, of the hazardous and toilsome retreat, of the bayonet charge of the "Forty Thieves" across the plain at Fatiko, of the disruption of the slave traders, and of the final pacification and annexation of a vast region, extending to the borders of Uganda. Sir Samuel Baker, in this brilliant campaign, passed over his old ground, but, as an observant geographer, many of his remarks convey fresh information; he collected numerous reports from traders who came from unexplored regions, and his nephew, Lieutenant Baker, made valuable astronomical and hypsometrical observations.

Ascending the Nile from Khartoum the expedition reached the junction of the Sobat on the 16th of February 1870, a distance of 684 miles above Khartoum by the river. The Sobat is one of the most important of the Nile tributaries, on the right bank, and is almost entirely unknown. Its basin presents an enticing field for future discovery, and, meanwhile, the information respecting the Sobat, collected by Sir Samuel Baker, is very acceptable. He found the river about 8 feet below the level of the bank in February, the water being yellowish and colouring the White Nile for a great distance. When he saw the mouth of the same river, in January 1863, it was bank-full. He thus continues his account of it:—

"The volume of water brought to the Nile by this river is immense, and the power of the stream is so superior to that of the White Nile that, as it arrives at right angles, the waters of the Nile are banked up. The yellow water of the Sobat forms a distinct line as it cuts through the clear water of the main river, and the floating rafts of vegetation brought down by the White Nile, instead of continuing their voyage, are headed back, and remain helplessly in the backwater. The sources of the Sobat are still a mystery; but there can be no doubt that the principal volume must be water of mountain origin, as it is coloured by earthy matter, and is quite unlike the marsh water of the White Nile. The expeditions of the slave-hunters have ascended the river as far as it is navigable. At that point seven different streams converge into one channel, which forms the great river Sobat. It is my opinion that some of these streams are torrents from the Galla country, while others are the continuation of those southern rivers which have lately been crossed by the slave-hunters between the second and third degrees of N. latitude. The White Nile is a grand river between the Sobat junction and Khartoum, and after passing to the south of the great affluent, the difference in the character is quickly perceived. We now enter upon the region of immense flats and boundless marshes, through which the river winds in a labyrinth-like course for about 750 miles from Gondokoro."

The junction of the Bahr Giraffe is 38 miles above the Sobat; and here the expedition came to its great difficulty. The White Nile was so obstructed by floating vegetation that a solid mass, called the *sudd*, had been formed. Dr. Schweinfurth tells us that the *sudd* is almost entirely composed of the *Papyrus* reed. The entire river became a marsh, beneath which the water oozed through innumerable small channels. As the percolation went on, the tangled mass acted as a filter, and the mud was deposited, forming banks and shoals. This had gone on for five or six years, and all navigation on the main river had ceased. The slave-traders then began to use the Bahr Giraffe, a channel passing from the White Nile above the *sudd* by a more direct course to a point below it. But there was much obstruction in the Bahr Giraffe also, canals had to be cut through dense masses of compressed vegetation, and the passage involved a long and toilsome operation, which tried the patience and endurance of officers and men to the utmost.

During August 1870 Sir Samuel Baker explored the *sudd* on the main river, which commenced about 12 miles above the Bahr Giraffe. The water below this extraordinary obstruction was quite clear from floating vegetation, as it had been filtered through the compressed masses. Ismail Yakub Pasha, the Governor of Khartoum, appointed in 1873, commenced the great work of removing the *sudd*. The Khedive had given orders for the execution of this important operation, in consequence of letters written by Sir Samuel Baker in 1870. There was no engineering difficulty in the undertaking, which was simply a matter of time and steady labour. Ismail Yakub set to work with a large force, and when Baker passed on his way home, about half the obstruction, which extended for many miles, had been cleared away. The force of the main stream, thus confined by matted and tangled vegetation, materially assists the work. The prodigious rafts of weed, as they become loosened, are hurried down the stream, and on one occasion these masses swept away and buried six native vessels. The *sudd* illustrates one important agency by which the courses of rivers are diverted, and shoals and islands are formed.

Sir Samuel Baker has, on three occasions, visited the mouth and lower course of the Bahr Gazal, the only Nile tributary on the left bank, and his remarks on this river are valuable. On all three occasions he remarked the total absence of current. In 1870 this was the more remarkable as it was in August and the river was full. He sounded the depth of the channel, which gave a remarkable mean of 7 feet throughout, showing that the bottom was perfectly flat, and had not been subjected to the action of any stream which would have caused inequalities in the surface of the ground. Baker thinks that there must be some outlet, concealed by the marsh-grass, which carries away the water brought down by the Djour, and the other streams explored by Schweinfurth, into the lacustrine regions of the Bahr Gazal; and there is no doubt that the evaporation, and also the absorption of water by the immense area of spongy vegetation, is a great drain upon the volume subscribed by the affluents from the south-west. The experience acquired by Baker during his visits to the Bahr Gazal, have convinced him that little or no water is given by it to the White Nile. The great affluents of the Nile invariably flow from the south-east, the Atbara, Blue Nile, Sobat, Asua, and Victoria Nile; a fact upon which Baker has dwelt in his former works. This proves that the direct drainage of the Nile Basin is from south-east to north-west; and hence Sir Samuel suggests that, as the inclination of the country is towards the west, there may be some escape from the lake marshes of the Bahr Gazal in the same direction.

The next point of geographical interest reached by the expedition was the river Asua, near its junction with the Nile, in latitude 3° 43′ N. The bed of the Asua was about 120 yards in width, and the maximum rise of the river about 12 feet. During the wet season

the Asua is a frightful torrent. In 1864 Baker had crossed the Asua about 30 miles higher up. About 8 miles to the south, and at an elevation of 1000 feet above the river, there was a splendid view over a wide extent of country. To the west, beyond the White Nile, was the precipitous mountain of Gebel Kuku, descending in a series of rugged terraces, from a height of 3 or 4000 feet to the river, at a point where it boils through a narrow gorge between the mountains. The entire volume of the Nile, above this pass, flows direct from the Albert N'yanza, which is about 30 miles to the south-west. Here, at Afuddo, Baker had hoped to bring his steamers; and he considers that this place is destined to become the capital of Central Africa. There is a beautiful plain, south of the Asua, where the little river Unyama falls into the White Nile, to which Baker gave the name of Ibrahiméyah, after the Khedive's father. The depôt for steamers will be near the mouth of the Unyama, and the trade of Central Africa, developed by the navigation of the Albert N'yanza, will concentrate at this spot, whence it will be conveyed by camels for 120 miles to Gondokoro, until a railway is constructed.

Advancing to the south, by Fatiko, the expedition crossed the Victoria Nile, and reached Masindi, the capital of Unyoro. Sir Samuel Baker gives a vivid description of the scenery, of the resources of the country, and of its inhabitants; and he collected much valuable geographical information from merchants, and from the envoys sent to him by M'tésé, the king of Uganda.

Two native merchants from Karagwé arrived at Masindi to purchase ivory from Unyoro, with whom Baker had several conversations. They enumerated the districts on the east shore of the M'wootan N'zigé, or Albert N'yanza, in their order from Unyoro to Machoonda, beyond which they knew nothing, except that the lake extends for an enormous and unknown distance. On the west shore is the cannibal country of Buamba. One of the districts named by the merchants was Barundi, which Baker identifies with Speke's Urundi, in about 3° S. latitude. This brings the Albert N'yanza *beyond* the north end of lake Tanganyika, and points to the conclusion that Tanganyika and M'wootan N'zigé are only one vast lake bearing different names according to the localities through which it passes. On another occasion Baker was told by native merchants that they had actually travelled from Chibero, on the Albert N'yanza, to Ujiji by canoe. Cameron's height of Tanganyika above the sea, which is the best that has been taken, is 2573 feet; and that of the Albert N'yanza, taken by Baker at Vacovia, in 1864, is 2720. The difference is so slight as to be fairly attributable to instrumental error.

The great geographical achievement of Baker's expedition is the establishment of his former positions by careful observations, and the accurate mapping of a tract of country which will form a point of departure for future exploration. This work is due to Lieutenant Baker, R.N., who established the latitude of twenty-four places by forty observations, fifteen longitudes by lunar distances, two by occultations of Jupiter's satellites, and the height of thirty-three places above the level of the sea. Lady Baker registered a complete series of meteorological observations. But this was a very insignificant portion of the able assistance given to the expedition by this devoted wife. She cared for the sick when there was no medical man with the party, and her gentle aid brought comfort to many whose strength might otherwise have failed.

We have briefly touched upon the points in Sir Samuel Baker's work which appear to be of most geographical interest; but no review can give any adequate notion of the contents of these charming volumes, which should be, and no doubt will be, carefully read by all English geographers, in common with thousands of their countrymen.

Colonel Gordon, R.E. has been appointed by the Khedive to continue the work which Sir Samuel Baker has so well begun, and thus the pioneer explorer will have the unusual satisfaction of knowing that his labours will not have been in vain, but that they will be made continuous by his able and energetic successor.

ESSAYS ON THE LANGUAGES, LITERATURE, AND RELIGION OF NEPAL AND TIBET; together with further Papers on the Geography, Ethnology, and Commerce of those Countries. By *B. H. Hodgson.* (Trübner, 1874).

THESE essays were originally printed partly in *Illustrations of the Literature and Religion of the Buddhists* (Serampore, 1841), and partly in *Selections from the Records of the Government of Bengal* (No. xxvii., Calcutta, 1857), and were reprinted in the *Phœnix*, Professor Summers's Magazine for China and Eastern Asia. They are now again reprinted in a collected form, with corrections and additions.

Mr. Hodgson, during his long residence at Katmandu, had unequalled opportunities of collecting information respecting the languages and religion of Nepal and Tibet, a field of research in which he still stands almost alone. His valuable papers were scattered in journals and magazines which were becoming every year more inaccessible, and this volume will be welcomed as a most valuable publication. There still remain, however, many extremely important papers by Mr. Hodgson, which have not been collected, and it is, therefore, very much to be desired that the reception of the present instalment should be such as to lead to the re-publication of the remaining essays.

The present volume is divided into two parts, the first containing eleven essays on the languages and literature of Nepal and Tibet, and on Buddhism; the second comprising eight essays on the physical geography of the Himalayas, on the aborigines of the Himalayas, on the origin of the military tribes of Nepal, on the tribes of Northern Tibet, and on the commerce of Nepal.

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NOTES ON THE LAND TENURES AND REVENUE ASSESSMENTS OF UPPER INDIA. By *Patrick Carnegy, Commissioner in Oudh.* (Trübner, 1874.)

MR. CARNEGY was engaged for ten years in carrying into effect the *talukdari* system in Oudh, which was decided upon by Lord Canning in 1858. The present publication consists of papers drawn up during the progress of the settlement by Mr. Carnegy, which he has since carefully edited in the hope that they may prove useful to students of Indian administration. The first two chapters describe the method of deciding claims to land, and the nature of the various proprietary and sub-proprietary tenures in Oudh; and in the third there is an account of the thorough investigation that was made into the tenant's right of occupancy. Then follows a very interesting chapter on the more influential class of

landlords, or *talukdars*, with an account of their origin and history; and the volume concludes with a description of the system of land assessment in Oudh. These five treatises are clear and comprehensive, and will give an enquirer an excellent general idea of the character of the land tenures in Upper India, and of the nature of the complicated and difficult duties entailed upon a settlement officer.

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ARCTIC EXPERIENCES, CONTAINING CAPTAIN TYSON'S WONDERFUL DRIFT ON THE ICE FLOE, &c. Edited by *E. Vale Blake*. (Sampson Low & Co., 1874.)

WE trust that this volume is not to be the only history of the voyage of the 'Polaris.' The first hundred pages consist of paragraphs on Arctic discovery with sensational headings, in the style and on the plan of the *New York Herald*. We are then treated to 300 pages of Captain Tyson's journal and remarks. Now Captain Tyson was not the commander of the expedition, nor the second in command who succeeded on the death of Captain Hall, nor had he charge of any of the scientific observations; and it does not appear that the book is published with the sanction or concurrence of his comrades. The tone of this officer's remarks leaves a very bad impression. He constantly sneers at the conduct of his fellow voyagers while in the ship, and his journal, kept during the drift on the floe, contains accusations against his comrades which nothing but positive evidence, of which there is none, can justify. It is a pity, we think, that such a production should be decked out with numerous illustrations from wood blocks which were prepared for other works, and with which Captain Tyson's proceedings have no connection whatever. This kind of "book-making" is always objectionable, but it is particularly so when it is adopted in order to dress up a worthless publication in false plumage.

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TABLES OF TEMPERATURES OF THE SEA AT VARIOUS DEPTHS BELOW THE SURFACE, taken between 1749 and 1868. Collated and reduced, with notes and sections, by *Joseph Prestwich, F.R.S., F.G.S.* (from the *Proceedings of the Royal Society*, No. 154, 1874).

MR. PRESTWICH has collected these series of observations with a view to the geological bearing of the subject, and they will form a valuable supplement to those collected since 1868. The older observations have been supposed not to be reliable on account of the error caused by pressure on the thermometers at great depths; but it appears that this error was taken into account so early as 1836. Mr. Prestwich's paper contains a record of 1300 observations, arranged according to the degrees of latitude, and all reduced to common scales of thermometer, measure of depth, and meridian. The observations extend over much ground that has not been covered by the expeditions of the 'Lightning,' 'Porcupine,' and 'Challenger'; and enable the author to arrive at some general conclusions, which in the main agree with those of Dr. Carpenter, especially as to the flow over the ocean bottom of cold under-currents from the Poles to the Equator.

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TOPOGRAPHICAL AND HISTORICAL SKETCH OF THE STATE OF OHIO, with an Historical Map. By *Colonel Charles Whittlesey*. (O. W. Gray, Philadelphia, 1872; London, Trübner & Co.)

THE map accompanying this interesting pamphlet shows the sites of ancient earthworks in the State of Ohio, and the different parts of the country occupied by the Indian tribes between 1758 and 1780, with their principal trails and war-paths. The pamphlet contains an account of the Indian tribes of the Ohio, with an abstract of so-called treaties with them, conveying land, and of the successive conflicts and wars with European settlers. During the revolutionary war the western Indians remained loyal, and a horrible massacre was committed upon their women and children by the militia of Western Pennsylvania; but their country was abandoned to the revolted colonists at the peace, who have nearly improved the poor Iroquois, Delawares, Shawnees, Miamis, and Wyandots off the face of the earth. Colonel Whittlesey, who is President of the Western Reserve and Northern Ohio Historical Society, also gives some carefully prepared statistical and topographical information relating to his State.

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Cartography.

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Indian Maps.

THE last parcel of maps received from India clearly proves that Colonel Thuillier is pushing forward the publication of the surveys with unabated energy. There are not wanting instances in which the results of a season's field work are published within a twelvemonth of its completion. This speedy publication is highly to be commended, for a map, not accessible to the public, represents so much capital locked up without bearing interest. The longer it is withheld from publicity, the more will it deteriorate in value, for though the main features of a country may not change, this cannot be said of minor topographical details. Old maps, therefore, assume more or less the character of historical documents, and cannot be trusted for information respecting the present condition of a country. We are glad to find that the Government of India fully appreciates the value of good maps, and nothing would please us more than an increase in the funds placed at the disposal of the Surveyor-General, as well as at that of his able coadjutors, Colonel J. T. Walker, superintendent of the great Trigonometrical Survey, and Colonels J. E. Gastrell, F. J. B. Priestley, and W. C. Anderson, of the Revenue Surveys, in order to enable these officers to make even more rapid progress than they have done hitherto, and that as little as possible of what we can perform ourselves may be left to be accomplished by posterity.

It is our pleasant duty to record the publication of thirty-two sheets of one-inch Topographical and Revenue Maps, in addition to a variety of others on a larger or smaller scale. The Trigonometrical Survey Office furnishes two new sheets of the map of Guzerat, and four (with hills) of that of Kumaon and Ghurwal, all resulting from surveys made in 1872-73, Major C. T. Haig being in charge of those carried on in Guzerat, and Lieutenant J. Hill in charge of the surveying party stationed in Kumaon.*

None of the new topographical survey maps† call for particular notice, and we will therefore confine ourselves to mentioning the officers to whose labours we are indebted for them, and the years in which the surveys were made. The two sheets of Chota Nagpore are from surveys made by Captain G. C. Depree, as far back as 1863-4. The sheets of Simla and Jutog are by Captain G. Strahan (1872-3), and two editions of the map have been photozincographed from the same original. It is to be completed in twenty sheets, of which thirteen have now been published. The four new sheets of Rajpootana are from surveys by Capt. G. Strahan, 1870-73, those of

* Great Trigonometrical Survey of India. Guzerat. Scale 1 m. = 1 inch. Sheets 8 and 9. Dehra Doon, 1874. 3s. each.

Great Trigonometrical Survey of India. Kumaon and Ghurwal. Scale 1 mile = 1 inch. Skeleton sheets 32 and 34, sheets 25, 26, 33 and 34 with hills. Dehra Doon, 1874. 3s. each.

† Chota and Nagpore Topographical Survey. Scale 1 m. = 1 inch. Sheets 12 and 13. Calcutta 1874. 2s. each.

Topographical Survey of India. Simla and Jutog. Scale 16 inches = 1 mile. Sheets 6, 7, 12 and 16. Calcutta, 1874. 2s. each.

The same map, scale 24 inch = 1 mile. Same sheets. 3s. each.

Preliminary Index to the sheets of the Topographical Survey of Simla. Scale 3 inch = 1 mile.

Rajpootana Topographical Survey. Scale 1 m. = 1 inch. Sheets 39, 44, 48, 49. Calcutta, 1874. 2s. each.

Bhopal and Malwa Topographical Survey. Scale 1 m. = 1 in. Sheeis 10, 12, 14 and 16. Calcutta, 1874. 2s. each.

Bhopal and environs. Scale 6 inch = 1 mile. 2 sheets. Calcutta, 1874.

The same map, 12 in. = 1 mile. Calcutta, 1874.

Ganjam and Orissa Topographical Survey. Scale 1 m. = 1 in. Sheets 34, 35, 36, 37, 68, 84 and 86 of the old series. Calcutta, 1874. 2s. each.

Bhopal and Malwa are by Capt. R. N. Riddell, 1872-3 (who likewise supplies us with a plan of the environs of Bhopal), and those of Ganjam and Orissa by Lieutenant-Colonel G. H. Saxton, Captain G. C. Depree, and Mr. J. Dyer, 1856-65. The delay in the publication of the latter can be explained, no doubt as arising from exceptional circumstances.

The Revenue Survey Maps are more numerous than usual, and include some fine specimens of photozincography. The officers of the North-West Provinces Revenue Survey* supply us with the new sheets of the one-inch map of Bijnour, surveyed in 1868-70, by Major A. D. Vanrenen, and with a plan of Nynee Tal, and environs, surveyed by J. Campbell and G. H. Cooke. This plan is exceedingly minute. Some idea of the nature of the country delineated may be gathered from the fact that, in order to get from the "Cart Bridge" to the "Cemetery" above, it is necessary to travel some 8 miles by road, although the direct distance between these two places is less than half a mile. The existence of features such as this would hardly be expected if we trusted to the delineation of the ground in forming our ideas of the nature of the country, and we are decidedly of opinion that in maps, drawn on so large a scale, and referring to a country presenting such differences of level, equidistant contours, or at all events a large number of altitudes ought to be inserted if they are fully to answer the purpose for which they are intended. The hill shading, in its present state, is only calculated to mislead.

The new sheet of the map of Oudh is by Major F. C. Anderson (1870-1).† The officers of the Panjáb Survey‡ supply us with a capital plan of the cantonment and environs of Mooltan, in two editions, both photozincographed from the same original. Proceeding to the Central Provinces§ we meet with a new map of Bhundara, in five sheets, and with three sheets of the map of Chanda, both from surveys by Captain F. Coddington (1867-71). There are, besides, plans of the cities of Hoshungabad and Dumoh, the former surveyed in 1863-4, the latter in 1864-5, and a very neat and handy map of the district of Dumoh, reduced from the Revenue Surveys to a scale of 4 miles to the inch.

From Bombay we have received a new edition of Colonel Laughton's plan of Bombay, first published in 1866, and two new sheets of the map of Sind, surveyed, in 1868-9, by Captain D. Macdonald, who still moves amongst the interminable ranges of sandhills, where we left him last.¶

We have likewise received for the first time a number of maps resulting from the Madras Revenue Survey, which has been in progress since 1857, under the superintendence of Colonel Priestley. This survey, like that of the rest of India, is based upon the great triangulation, a circumstance for which we are mainly indebted to the earnest remonstrances of Colonel Thuillier, who succeeded in convincing the Board of Revenue that a map of permanent scientific value could be produced only in this manner, and that the additional expense involved by following his advice would be comparatively trifling. The survey has been carried on without interruption since the date mentioned, and out of twenty districts, four (viz., Nellore, Madras, Trichinopoli, and Tinnevelly), have now been surveyed completely or nearly so, whilst in eleven others more or less progress has been made.

Government villages are surveyed on a scale of 16 inches, Zemindari villages on that of 4 inches to the mile, and the plans, together with area books and other information respecting the nature of the land, which enables the revenue officers to make fair and just assessments, are published on the original scale. The village plans are combined into Taluk maps, on a scale of 1 mile to the inch, and the latter into district maps on half that scale.

The village plans are plain and unpretending in appearance, but fully answer the cadastral purposes for which they are intended.

The system of publishing them on an uniform scale strikes us as being far preferable to the spasmodic publication of isolated cities and cantonments, on a variety of scales, frequently unnecessarily large, which prevails in Northern India.

The Taluk maps are produced by a photographic process, but the names are printed from type, which detracts largely from their appearance. In the production of district maps a more elaborate system of colour-printing is applied. The map of the district of Nellore,* now before us, is probably a fair type of that class of map. The outline is printed in grey, the roads in red, and the names, from type, in black. Towns and villages are classified according to their population, irrigated and unirrigated lands are distinguished, district roads and cart-tracks shown, and the orographical features are fairly attended to. We do not doubt for a moment that these Madras maps are as correct, and their value intrinsically as great, as that of the maps published at Calcutta, but they are certainly inferior to them as respects technical execution. There are, however, exceptions to the rule, and the map of Horoornoorakul (we adhere to the rather inconsistent spelling of the original) with parts of adjoining Taluks is undoubtedly a very pleasing specimen of colour-printing†

We now turn to maps on a smaller scale, amongst which the Indian Atlas‡ deservedly holds the first rank. It has been increased by three quarter-sheets since our last notice, that representing a portion of the Himalaya (64 S.W.) being a very fine specimen of hill engraving.

The sketch-map of India and that of the Bombay Presidency§ both on the same scale, must be looked upon as preliminary or rather temporary maps, which will be withdrawn as soon as more complete and satisfactory maps of this kind shall be ready for publication.

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* North-West Provinces Revenue Survey. District Bijnour. Scale 1 m. = 1 inch. Sheets 2, 5 and 7. Calcutta, 1874. 3s. each.

North-West Provinces Revenue Survey. Cantonment and Settlement of Nynee Tal, 1872-3. Scale 6 inch = 1 mile. Calcutta, 1874.

The same map, 10 inch = 1 mile. 2 sheets. Calcutta, 1874.

† Oudh Revenue Survey. Scale 1 inch = 1 mile. Sheet 39. (District Gonda.) Calcutta, 1874. 3s.

‡ Punjab Revenue Survey. Cantonment, city and environs of Mooltan, 1871-72. Scale 6 inch = 1 mile. Calcutta, 1874.

The same, 12 inch = 1 mile. 10 sheets and index. Calcutta, 1874.

§ Central Provinces Revenue Survey. District Chanda. Scale 1 inch = 1 mile. Sheets 2, 3 E and 10. Calcutta, 1874. 3s. each.

Central Provinces Revenue Survey. District Bhundara (Pergunnahs Pertabgurh and a portion of Komptha Tehseel Sakolee). Scale 1 inch = 1 mile. 5 sheets. Calcutta, 1874.

Central Provinces Revenue Survey. District Dumoh. Scale 4 miles = 1 inch. Calcutta, 1874. 3s.

Central Provinces Revenue Survey. Civil Station, City and Cantonment of Hoshungabad. Scale 8 inch = 1 mile. Calcutta, 1874.

Central Provinces Revenue Survey. Civil Station and City of Dumoh. Scale 10 inches = 1 mile. Calcutta, 1874.

¶ Map of the southern portion of the island of Bombay, reduced from Colonel Langhton's general map of 1872, with subsequent alterations 1873. Scale 1 : 9600. Poona, 1874.

Sind Revenue Survey. Scale 1 mile = 1 inch. Sheets 80 and 81 (Oomerkot). Calcutta, 1874. 3s. each.

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* Map of the Nellore District, reduced from the Revenue Survey Maps. Scale 2 miles = 1 in. Sheets 2, 3 and 6. Madras (Chepauk), 1873.

† Combined map of Horoornoordkul, and a portion of Madikeri-Haleri Nadu Merkara Taluk. 1 sheet. Scale 2 m. = 1 in. Madras (Chepauk), 1873.

‡ Indian Atlas. Scale 4 in. = 1 mile. Quarter-sheets 9 N.W., 64 S.W., and 128 N.E. Calcutta, 1874. 1s. 6d. each.

§ Sketch Map of India, showing political and revenue divisions. Scale 32 m. = 1 in. 6 sheets. 5th edition, with additions to January 1872. Calcutta, 1874. 12s.

Preliminary map of the Bombay Presidency, compiled from the latest materials, and from information furnished by the Bombay Revenue Survey and Settlement Department in the office of the Surveyor-General of India, December, 1873. Scale 32 m. = 1 in. Calcutta, 1874.

The sketch-map of India, however, though rather rough looking, is stated to embody the results of all surveys up to date, and more than fulfils the promise held out by its title, for in addition to the political boundaries it gives the railways and numerous altitudes. Of really permanent value is the new map of Western Bengal* on a scale of 4 miles to the inch, which is based exclusively upon the revenue surveys. We hope the publication of this map, as well as of that of Eastern Bengal, will be pushed forward with due diligence, for, on account of its scale and its very ample detail, it is eminently calculated to meet the requirements of the public.

Two maps extending beyond the British boundary remain to be noticed. The first is described as trans-frontier map No. 9,† and contains the whole of Nepal and Sikkim, with a considerable portion of Tibet. The native explorations conducted by Major Montgomerie, up to 1872, as well as Dr. Wright's sketches of Nepal, E. T. Johnson's map of Sikkim, Captain Carter's sketches, and Dr. Hooker's map, have been embodied in it, but we cannot help thinking that if existing materials had been used more exhaustively, certain portions of it might have been made more complete. But even now it abounds in useful information, and affords the readiest means of gaining a cartographical knowledge of Nepal, whose ruler has hitherto excluded English surveying parties from his territories.

The last map to be noticed is one of the frontier districts of Assam,‡ to the E. of longitude 92° 30′, and has been prepared for the use of the Duffla Expedition. The British territory is delineated fully, but the intelligence department has evidently not succeeded in gaining much information respecting the territory beyond it, which is almost a blank.

Map of the Turco-Persian Frontier.§

BOUNDARY disputes are amongst the most fertile sources of war, and the governments of Turkey and Persia are, therefore, deserving of credit for having listened to the advice of England and Russia, and referred their dispute to an international commission, which was charged not only with a definition of the boundary, but likewise with a survey of the country through which it passes. The commissioners appointed under the treaty of Erzerum (1847) were General Chirikof for Russia, Colonel Williams (afterwards Sir W. F. Williams of Kars) for England, Dervish Pasha for Turkey, and Mirza Jafer Khan for Persia. They were assisted by a staff of surveyors, Lieutenant Glascott, of the Royal Navy, undertaking to determine the astronomical positions, and three officers of the Russian Topographical Corps, MM. Proskurekof, Tsirikof, and Ogranovich, the detail survey. The commissioners began their labours on the Gulf of Persia, but it became evident, at the first meeting, when the possession of Mohammera and of some neighbouring islands led to a violent contention, that no settlement of the boundary could be arrived at, and the English and Russian Commissioners, therefore, applied to their governments for authorization to confine themselves to the survey of the country, and leave the definition of the boundary to some more auspicious occasion. The request was granted readily, and in the course of four years (1849-52), a strip of country extending from the Gulf of Persia to the foot of Mount Ararat, and covering an area of about 10,000 square miles, was carefully surveyed. In 1859 Lieut. Glascott and two draughtsmen were sent to St. Petersburg, the former to lay down his astronomical positions, the latter to copy the Russian surveys, a task which appears to have occupied them for no less than five years! The expenses of the survey, as far as they concern England, have been stated to amount to 54,000*l.*, and it is therefore all the more to be regretted that the interesting map resulting from so considerable an expenditure should have been withheld for so many years from the scientific public. A photographic reduction of it was certainly communicated by the Russian Government to Professor Kiepert, some ten years ago, but it is only in consequence of its publication by the Ordnance Department, that the results of this international survey have become accessible to the geographical world at large.

The map now before us is elaborately printed in colours, but it is by no means a favourable specimen of chromo-lithography. The hills, which are drawn very faintly and by no means characteristically, are almost obliterated by some of the heavier tints, and some of these, even where they cover large areas, can hardly be identified. This defect might easily have been obviated by the use of symbols, or of tints selected with more judgment. The nomenclature of the map is in French, and we trust has been carefully revised by a competent scholar. The topographical details, irrespective of the hills, are most ample, and the extent of gardens, palm-groves, forests, pastures, &c., can be traced readily.

Grateful as we are for the publication of this map, we should like to see it supplemented by a report on the country which it delineates, and many portions of which have never been trodden by the foot of a European. Such a report, we understand, has been published by the Turkish Commissioners in 1862. It is highly spoken of by Dr. Mordtmann, and might possibly repay the labour of translating it.

De Bruyn's Map of Ancient Palestine.*

THIS is the third edition of a map first published in 1844. The author has carefully consulted the authorities within his reach, and it is hardly his fault if much of his work has already been superseded by the surveys conducted at the instance of the Palestine Exploration Fund. The map is very neatly engraved, and accompanied by explanatory *prolegomena*. The names of modern sites and places with which the ancient localities have been identified have not been inserted upon it, though the scale is sufficiently large for such a purpose. In a *disquisitio* appended to the prolegomena, the author discusses the site of Tarichea, and contends that it was to the north, and not to the south of Tiberias.

Geological Map of Western Australia.†

THE map before us extends to latitude 27° S. and longitude 120° E., and embodies the results of the geological surveys made up to June 1872, under the direction of Mr. Henry Y. L. Brown, the government geologist. Fourteen geological formations are distinguished by colours, mesozoic and metamorphic rocks predominating in the interior of the country.

E. G. RAVENSTEIN.

* Map of Western Bengal, compiled from the revenue surveys, based on the great triangulation in the Surveyor-General's Office. Scale 8 m. = 1 in. Sheets 12, 16, and 17. Calcutta, 1874.

† Great Trigonometrical Survey of India. Trans-frontier maps. Skeleton sheet 9. Scale 1 : 1,013,760. Calcutta, 1874. 4s.

‡ Part of the northern frontier of Assam, comprising portions of districts Darrang, Lakhimpur, and Sibsagar. Prepared for the use of the Duffla Expedition in the office of the Surveyor-General of India. Scale 4 in. = 1 m. Calcutta, 1874.

§ Map of the Turco-Persian Frontier, made by Russian and English officers in the years 1849-55, on the scale of 1 : 73,050, and reduced to the scale of 1 : 253,440, or 4 English miles to 1 inch, at the Ordnance Office, Southampton (Major-General Sir Henry James, Director), 1873.

* Palaestina ex veteris aevi monumentis ac recentiorum observationibus illustravit Marinus Didericus de Bruyn. Trajecti ad Rhenum, 1874. Scale 1 : 420.000.

† Map of part of the colony of West Australia, showing the progress of the geological survey from August 1870 to June 1872, by H. Y. L. Brown. Melbourne, 1873.

Log Book.

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The Arctic Expedition.—The following letter has been received from the Prime Minister, by the President of the Royal Geographical Society:—

"10, DOWNING STREET, WHITEHALL,
Nov. 17th, 1874.

"DEAR SIR HENRY RAWLINSON,—Her Majesty's Government have had under consideration the representations made by you on behalf of the Council of the Royal Geographical Society, the Council of the Royal Society, the British Association, and other eminent scientific bodies, in favour of a renewed expedition, under the conduct of Government, to explore the region of the North Pole; and I have the honour to inform you that, having carefully weighed the reasons set forth in support of such an expedition, the scientific advantages to be derived from it, its chances of success, as well as the importance of encouraging that spirit of maritime enterprise which has ever distinguished the English people, her Majesty's Government have determined to lose no time in organizing a suitable expedition for the purposes in view.—I remain, yours faithfully,

"B. DISRAELI.

"Major-General
SIR HENRY RAWLINSON, K.C.B."

The Arctic Seal and Whale Fishery.—The Arctic fleet, with the exception of the 'Arctic,' has now returned safely to Dundee after a singularly successful year. At the sealing last February and March, 577 tons of oil were obtained, being the yield from 46,252 seals. The most successful ship at the sealing was the 'Esquimaux' (Captain Yule); next the 'Arctic' (Captain Adams); and third, the 'Ravenscraig' (Captain Bannerman). They took 10,300, 9500, and 7800 seals respectively. The value of the sealing (a ton of oil being worth 35*l.*), was 20,195*l.*, besides the 46,252 skins, averaging 4*s.* 6*d.* each, or 10,406*l.* So that the total value of the seal-fishing for 1874 is 30,601*l.* The whale-fishing was still more valuable. The details are as follows:—

	Whales.	Tons of Oil.	Tons of Bone.
2. 'Active' (Capt. Fairweather).....	25	160	9
4. 'Victor' (Capt. Denchars)	24	155	8
7. 'Esquimaux' (Capt. Yule)	16	135	6
1. 'Camperdown' (Capt. Gravill) ...	32	175	9
9. 'Narwhal' (Capt. M'Lennan).....	8	95	5½
5. 'Polynia' (Capt. Kilgour)	18	155	8
6. 'Ravenscraig' (Capt. Bannerman)	16	130	6
3. 'Intrepid' (Capt. Soutar)	24	185	10
8. 'Erik' (Capt. Walker).....	11	100	5
	174	1290	66½

The price of whale oil is 40*l.* a ton, and of bone 540*l.* a ton. At these prices the oil taken in 1874 is worth 51,600*l.*, and the bone 35,910*l.*, giving a total of 87,510*l.* For both the seal and whale fishing the financial result is therefore 118,111*l.* The following is the result of the whale fishing since 1865:—

	No. of Ships.	Oil.	Bone.
1865	7	630	30
1866	11	340	18
1867	11	20	—
1868	13	970	50
1869	10	140	7½
1870	6	760	40½
1871	8	1165	61½
1872	10	1010	54
1873	10	1352	69
1874	10	1290	66½

Last year Captain Adams, in the 'Arctic,' led the way down Prince Regent's Inlet to a fishing ground not visited before, and this year the whalers have penetrated even further, some of them having been south of the mouth of Bellot's Strait. Captain Kilgour, in the 'Polynia,' went up Lancaster Sound, and caught no fewer than ten whales near Cape York, at the entrance of Prince Regent's Inlet, between the 10th and 12th of July. On the 26th Captain Kilgour landed in Batty Bay, and discovered the cairn containing records, which were left there by Mr. Kennedy on August the 6th, 1852, when in command of Lady Franklin's search-vessel the 'Prince Albert.' The records, with a sledge, a stove, two ice-knives, and other articles found on the south side of the bay, where the 'Prince Albert' wintered, have been brought to Dundee. The records are in an excellent state of preservation. On August the 3rd the 'Polynia' reached Bellot Strait, and was made fast to the land-ice off Long Island, where several whales were seen. This was the first time that any whaler had penetrated so far down the Gulf of Boothia, and the 'Polynia' thus reached the furthest point attained by Sir Leopold McClintock, in the 'Fox,' in 1859. The 'Polynia' was beset off Cape Scoresby, and again at the entrance of Creswell Bay, where she was in considerable danger, and experienced some severe nips, which made it necessary to heel her over, in order to caulk the leaks, chiefly near the water-line. This was successfully done off Cape Kater, and the 'Polynia,' after an eventful and very successful cruise, arrived safely at Dundee in November.

The whole of the fleet, except the 'Esquimaux' and 'Active,' went down Prince Regent's Inlet, as far as Creswell Bay, where the ice came in upon them, and they were all severely nipped. The 'Ravenscraig,' commanded by Captain Bannerman, was beset for nearly three weeks, and was in great danger. This is the first time that Captain Bannerman has commanded a ship. He was first mate of the 'Arctic' last year, when Captain Markham was on board, who was struck by his energy and fine seamanlike qualities. We heartily congratulate this able young sailor on the very successful result of his first command. The 'Erik,' commanded by Captain Walker, among others, was beset in Creswell Bay, and drifted as far as abreast of Bellot Strait. The nips were so severe that she was several times lifted 3 or 4 feet out of the water. She got clear at the same time as the 'Polynia.' On the 25th of October, Peter Ramsay, of Kirkaldy, a seaman upwards of seventy years of age, died upon the 'Erik.' He had actually been fifty-six whaling voyages to the Arctic Regions.

Levelling between the Aral and Caspian Seas.—During the summer the Imperial Russian Geographical Society, and its Orenburg Section, organised a scientific expedition for taking a series of levels between the Aral and Caspian Seas, the expenses being defrayed by the Russian Government. We now learn, from M. A. Lomonosoff, F.R.G.S., the Assistant-Secretary of the Russian Geographical

Society, that this expedition, commanded by Colonel Tillo, has accomplished the work that was entrusted to it, and returned to Orenburg in November. A preliminary computation of the observations places the sea of Aral about 250 feet above the Mertwi Kooltook Bay of the Caspian, or 165 feet above the level of the ocean. The respective heights of the Caspian and Aral were first obtained in 1826 by Colonel Berg, assisted by Messrs. Jagoskin, Anjou, and Duhamel. They placed the Aral Sea 117.6 feet above the Caspian. In 1858 M. Struve made a second measurement to determine the height of the Aral Sea above Orenburg, and calculated the height of Orenburg above the ocean level and the Caspian. His result made the Aral Sea 132 feet above the level of the ocean.

Trade of Northern Coast of Russia.—The German schooner 'Minerva' returned on the 26th of October to Cronstadt from a cruise in the White Sea, being the last of a fleet of fifteen vessels which have all visited the mouth of the Petchora River this season and have returned to Cronstadt, laden with timber. There were also two Dantzic, two British, and a Russian craft in quest of salmon, engaged in the same locality. These vessels are all schooners of strong build and shallow draught, the bar of the Petchora having barely two fathoms of water upon it. A German vessel grounded on it this last summer and was lost, though the crew and cargo were saved. From the reports of the skippers, this year seems to have been very favourable for ice navigation, and there has been an absence of violent storms which are generally common between the North Cape and the White Sea. Last year, on the other hand, drift-ice was met with in considerable quantities in July and August, and a German schooner, 'Ceres,' narrowly escaped being crushed between some lofty bergs.

Some fishermen settled at the mouth of the Petchora are talking of establishing a fishing station on Kalguyef Island, and there is a probability of its also being selected as a depôt for whalers by a Russian whaling association in Archangel. Attention has thus been drawn to it, and a recent number of the *Ausland* furnishes us with the information which has been acquired. The island itself is about 250 miles in circumference as far as could be ascertained by the time taken to travel round it. Most of the inlets and bays afford suitable anchorage, the water immediately off the coast averaging from 9 to 12 fathoms depth, except to the eastward, where is a huge sandbank, named Plaskiya Roschki. The interior of the island is unexplored, but known to be hilly, and to culminate into two mountains covered with Iceland moss. From the hills numerous streams, teeming with fish, flow down; the sea around swarms with cod and various other kinds of fish common to Arctic seas. Walrus, seals, and sea-cows are occasionally caught, but the fishermen prefer to wage an easier and more inglorious warfare against the wild geese, swans, eider and other ducks, which flock thither in vast numbers in spring time. The fattest and heaviest birds are driven into nets spread out to catch them, and they then fall easy victims. Ten men in the course of a month will thus bag about 2500 good-sized birds, some of which are generally retained for home consumption, the rest being exported. About seventy or eighty hunters and fishers, altogether, annually repair to the island of Kalguyef, some being Samoyedes from the Kanin-Nossor promontory. The yearly export to the Meser district has greatly increased, and now consists of about 71 cwt. of down feathers, half that amount of other feathers, and about 750 swans' plumages. A thorough exploration of the island would be by no means unproductive, as the interior is frequented by numbers of Arctic foxes, Polar bears, and reindeer.

The German Colonies in Palestine.—A body of German Protestant dissenters, who call themselves the "Templars," and have their chief seat in Württemberg, have established a number of colonies in Palestine, which, to judge from a report lately published in the Augsburg *Allgemeine Zeitung*, enjoy a prosperity denied to the now abandoned American and German settlements.

The colony at Haifa, though only founded in September 1869, already numbers 300 members, who devote themselves chiefly to agricultural pursuits. About 17 acres on the slope of Mount Carmel have been converted into vineyards, and a terrace at the foot of the mountain has been planted with olive-trees. The colonists have purchased 300 acres of arable land near the village et-Tineh, 4 miles to the south of the town; and the grassland in the plain of Esdraelon supplied them last year with 60 loads of hay. The Governor of Damascus has promised to present them with 3000 acres of land, but has not yet done so. There is a congregational hall, which is also used as a school, a store, an hotel, and a windmill. The colony to the west of Yafa had 232 inhabitants in March last, amongst whom there were many masons, carpenters, smiths, and other mechanics. Most of the colonists inhabit the timber houses left by their American predecessors, but several stone houses have lately been erected. There are a church and school, a hospital, a flour and wood store, a grocery store, an hotel, a steam-mill, and a laundry, with washing-machines imported from Stuttgart.

The third colony, Sarona, lies about 5 miles to the north of Yafa, on a height not far from the sea. It contains already fourteen flat-roofed stone houses, one and two stories in height, and is abundantly supplied with water from draw-wells, 70 feet in depth. The space behind the congregational hall has been planted with 1200 acacias, eucalypti, and other trees, and it is proposed to create similar plantations to the west of the village. The colonists own 310 acres of land, 80 of which lie in the valley, and the sandy soil along the sea-shore is said to be particularly favourable to the growth of vines.

At Ramleh there are two Templar families, who manage an hotel and a treadmill, and at Jerusalem there are nine families, mostly mechanics.

The "Colonization Fund" had an income, in 1873, of 10,451*l.*, and its accumulated capital, resulting from the investments of the colonists, amounted to 12,722*l.* in the beginning of the present year.

Lieutenant Cameron.—We are informed, in a letter from Zanzibar, dated October 21st, that the country between Unyanyembe and the coast is in a very disturbed state, rendering communication difficult. The power of Mirambo, the negro insurgent, is increasing daily, and the Arabs are at their wits' end. No news has been received from Lieutenant Cameron since March 4th. There is, however, no cause for

anxiety at present, as the disturbed state of the country would probably make it difficult for messengers to pass. If Cameron, as is not improbable, has penetrated into the Manyuema country, or passed on to the north of lake Tanganyika, we cannot expect to receive tidings of him for some time.

Mr. Stanley on the Rufiji.—In our number for August, p. 181, we gave an account of Captain Elton's expedition up the Rufiji River, accompanied by a naval surveyor, in which he completed a survey, and furnished full information respecting the trade. Mr. Stanley, who has been sent out by the proprietors of the *Daily Telegraph* and *New York Herald*, to write letters for those journals on the state of affairs on the east coast, and in the equatorial lake regions of Africa, has since visited the delta of the Rufiji, and ascended the river to Kisu, the point reached by Captain Elton. Mr. Stanley has collected much detailed information respecting the course of the river Rufiji, the slave trade, and the commercial prospects of the region it drains, which has been published in the *Daily Telegraph* of November 24.

A Bifurcation between the Danube and Rhine.—It has been noticed for many years past that some distance below Donaueschingen a portion of the water of the Danube was sucked up by the soil, the river continuing its course much reduced in size. The water thus abstracted was supposed to give rise to the source of the Aach, which rises beyond a range of limestone hills to the south, and discharges its waters into the Lake of Constance, and thus to the Rhine. Recently the formation of two large holes, or "swallows," has been noticed in the Danube, and the amount of water swallowed up by them was sufficiently large to deprive the mill-owners of Möhringen and Tuttlingen, lower down the river, of the necessary water power. They examined the spot on the 3rd of October last, and resolved to stop up the holes. But to this the mill-owners on the Aach object, and the legal proceedings threatened by them may possibly lead to a thorough investigation of this interesting phenomenon.

Exploration of the Peruvian Montañas.—A Commission composed of Major Ribera and Mr. Wertherman, an engineer in the service of Peru, has started to explore the rivers Chanchamayu, Perene, and Tambo, to ascertain if navigable communication is possible between Yquitos on the Amazon and the confluence of the Perene, 15 miles from the fort of San Ramon. Mr. Meiggs, with reference to the influence that such communication must have on the proposed lines of railway from the Oroya terminus, has aided the Commission very materially.

Colombia.—The Government of the nine United States of Colombia has formed a Statistical Department, with a view to the collection and diffusion of trustworthy information respecting the political situation and commercial movements. A review is to be issued by the department at Bogota periodically, and that for July has been published. It gives the area of the Republic at 455,000 square miles; and describes the principal topographical features as consisting of three great cordilleras of the Andes traversing the Republic from north to south through its whole length, and separating the valleys of the Atrato, the Cauca, and the Magdalena, all navigable by steamers. The Magdalena is the great fluvial highway for the five central States and those bordering on the Atlantic; and has had steam navigation for 160 leagues since 1852, eight to twelve boats running between Honda and Baranquilla, whence there is a railroad to the port of Savanilla (15 miles), constructed in 1871. The population of Colombia, according to the last census, in 1870, is 3,000,000. The revenue of the Republic, in 1873, was $4,000,000, of which $2,775,450 were derived from customs, and $799,213 from salt mines. The expenditure left a surplus of $850,000. The public debt amounts to $21,000,000. Foreign commerce was represented, in 1873, by $12,500,000 worth of imports, and $10,500,000 of exports; carried by 729 sailing vessels (46,697 tons) and 281 steamers (14,459 tons). The chief articles of export are gold and silver ($2,500,000), tobacco ($2,000,000), coffee ($1,900,000), bark ($1,800,000), hides ($500,000), indigo ($400,000), Panama hats ($260,000), cotton ($250,000), and india-rubber ($150,000).

It is twelve years since there has been a civil war in Colombia. The last was in 1862, which ended with the reorganization under the constitution of 1863, on a federal basis, each of the nine States having separate local legislatures. There is no State church, and complete liberty of conscience and worship for all creeds. Brigandage is, and always has been, unknown; nearly all the States have adopted trial by jury, and imprisonment for debt has been abolished.

The Austro-German Alpine Club held its annual meeting on the 28th of August last, at Kempten, when 121 delegates, representing 44 branch societies attended. It was resolved to publish a journal *(Mittheilungen)* in addition to the *year-book*, and to devote 284*l.* to the improvement of Alpine paths and the erection of houses of refuge. The next annual meeting will be held at Innsbruck.

The French Alpine Club held its first General Meeting on the 20th of this month. M. Cézanne presided, and M. Adolphe Joanne, the Vice-president, reported on the past progress of the Club, which, though only founded on the 2nd of April last, numbers already 320 members in Paris, and 300 more in the "sections" of Auvergne, the Upper Alps, the Dauphinée, Savoy, Lyons and the Vosges. The "Annuel," to be published in March, will contain narratives of extraordinary mountain ascents accomplished during last season, amongst which those of the Jungfrau by M. and Mad. Gamard, and by M. Georges Dévin, and of Mont Cervin by M. and Mad. Millot and by M. Dévin, will occupy a distinguished place, and the secretary hopes that these will go far to refute the opinions of those who deny to Frenchmen the quality of tourists and Alpine climbers.

SUN'S TRUE BEARING OR AZIMUTH TABLES.

WE are glad to announce that a continuation of Captain Burdwood's valuable Tables of the Sun's True Bearing or Azimuth, computed for intervals of four minutes, is in the press, and will shortly be published. This part will contain an explanation for using the tables in various languages, thus adding considerably to its value. It will be remembered that the tables already published embrace that part of the world between the 60th and 30th parallels of latitude. The continuation will complete the tables to the Equator, and will appear in precisely the same form as its predecessor. The work has been undertaken by Captain J. E. Davis, R.N., of the Hydrographic Department of the Admiralty, and Mr. Percy L. H. Davis, of the Nautical Almanac Office.

Correspondence.

:o:

BALA SAGUN AND KARAKORUM.

To the Editor of the "GEOGRAPHICAL MAGAZINE."

SIR,—In reading the recent brochure of Professor V. Grigorief, "The Karakhanides in Maverannahr," a notice of Bala Sagun recalled to my mind the letter of Colonel Yule, in your number for August (p. 167).

The confusion of Bala Sagun with Karakorum seems to have arisen from a misquotation from D'Ohsson, *Histoire des Mongols*, by M. Semenof.

In one of the notes to his translation of Ritter, vol. ii., p. 264, he says: "The Muhammadan authors call this ancient capital of the Turks (*i.e.* Karakorum) Ordu-Balik or Belasagun (Balgassun), which, however, is only its title;" and quotes D'Ohsson, *Histoire des Mongols*, T. i., p. 76. D'Ohsson, however, says no such thing. On page 64 of vol. ii. he says, "*Il s'éleva bientôt une ville, que l'Empereur nomma* Ordou-Balik, *ou la ville d'Ordou, mais, qui fut plus connue sous le nom de Caracouroum*," while on page 442 of vol. i. he quotes from Juwaini, translating as follows:—"*Il se dirigea vers Bela-Sagoun, ville que les Mongols appellent aujourd'hui* Gou-Balic." M. Semenof seems to have confused the two passages.

The brochure of Professor Grigorief, of which I spoke, is a translation with notes of the 6th chapter of the 2nd part of the "History of Dynasties," or "Chronicle of the Chief Astrologer," written by the Dervish Akhmed-Effendi, the chief astrologer of the court of the Osmanli Sultan Muhammad IV., commonly known as Munedjim-Bashi (born about 1630 and died about 1701), of which a Turkish translation was made by Nedim-Effendi in 1719-29, and was published at Constantinople in 1868-9, in three volumes.

Munedjim-Bashi begins as follows:—

"Of the Khans of Turkistan.

"These khans claimed to be descended from Afrasiab. Twenty of them reigned in all. The capital of their dominions was at first the city of Balasagun, but afterwards Bukhara and Samarkand. They began to rule over Mavrennahr in the year 383 (993 A.D.), and their dynasty came to an end in 609 (1212). Their main possessions were:—1. *Bala Sagun*, which was their capital, situated at the beginning of the 7th climate in 102° of longitude and 48° of latitude, not far from Kashgar, and considered from of old the boundary city of Turkistan; 2. *Kashgar*, the capital of Turan, in the 6th climate, in 106° of longitude and 45° of latitude; it is also called *Ordukend*, and is the birthplace of several well-known scholars; 3. *Khotan*, in the most distant part of Turkistan, longitude 107° and latitude 42°; 4. *Karakorum*; 5. *Taraz*; 6. *Farab*: all three important cities."

Professor Grigorief, in his note, besides mentioning the position of Bala Sagun as given by Al-Biruni, quotes from Hadji Khalfa, in his *Jihán Numá* جهان نما (Constantinople edition 1147 of the Hejra, p. 367) the longitude as 101° and the latitude as 47½°.

Besides the passage from Juwaini, condensed by Colonel Yule, there is another passage (D'Ohsson i., 433) where mention is made of Buku-Khan, "who went westward from Ordu-Balik (Karakorum) until he arrived in Turkistan, where he saw a fine plain, well watered and with rich pastures; he established his residence there, and built there the city of Bala Sagun, that is now called Gou-Balik." Abul-Ghazi-Khan, writing much later, says, "There was at this epoch in the city of Bala Sagun a khan named Ilik, a man of feeble character. The Mongols call this city Ghou-Baliq (the good city). *Ghou* means good and *Baliq* city. In the environs of this city camped many Turks, principally Qanqli, who did not cease to pillage the country and destroy the harvests. ("Hist. des Mongols et des Tatares. trad. de Baron Desmaisons" vol. ii., p. 49.)

The geographer Moqaddasi (Sprenger's *Post u. Reise routen*, p. 19) places Bala Sagun in the district of Isbyjab, which is identified with the modern Tchimkent, and in his list it is mentioned near Myrkey (Merke). If Bala Sagun were somewhere near the valley of the Tehu it would correspond with the statement (D'Ohsson i., 167) that Gutchluk, having pillaged the treasure of the Gurkhan at Uzkend, during his absence on a campaign against Samarkand, wished to surprise Bala Sagun. From Uzkend to the valley of the Tehu there would be a straight and easy road through the mountains from Namangan to Aulié-ata (Taraz). At the same time the itineraries quoted by Sprenger, (p. 23) make the distance from Isbyjab to the capital of the Turkish Khan, which is presumably Bala Sagun, 75 farsangs, or, roughly, about 445 miles, which would bring that place into the valley of the Ili, as Colonel Yule suggests. Professor Grigorief also locates it in the valley of the Ili.

It is difficult to suppose that Bala Sagun is a corruption of the Mongol *balghasu*. It is evident from the Mongols calling the place Gou-balik, that Bala Sagun was not a Mongol name. It is more reasonable to suppose that Bala is the Persian *bala* or *baliand* (upper), and that the place was called Upper Sagun. In this case mention of the old town of Sagun must be sought for.

EUGENE SCHUYLER.

ST. PETERSBURG, *October 28th*, 1874.

NOTE BY COLONEL YULE.

Mr. Schuyler having been good enough to send me the preceding letter to read, I take the opportunity of adding a note.

Juwaini's expression, as given by D'Ohsson, conveys to me the impression that the name *Gubalik* was given to the city by the Mongols *of the Chinghiz age*. *Balghasún* alone could not have been the earlier *name* of the city, meaning as it does merely "city"; but it might have been adopted and corrupted by foreigners not knowing its meaning, like *Stambúl* from εἰς την πολιν. It is curious that *Gubalik* does not occur, so far as I know, in any of the medieval narratives letters of missionaries, &c., but there is a possible trace of it in one of the maps by Andrea Bianco in W. Mark's Library (No. 12). This calls the Chaghatai division of the Mongol Empire "*Imp. de Medio i.e. seu* Cobalek."

If this is not a mere chance clerical error for *Armalek* (as Almalig was called by the Franks) it may indicate that Cobalek (or *Gubalik*) was the same as Almalik, which was the recognised capital of Chaghatai. The expression *Imperium de Medio* probably referred to the middle position of the Khans of Chaghatai between the Great Kaan in Cathay and the Ilkhans in Persia; and it occurs more clearly elsewhere as *Imperium Medium*. Some writers and geographers, however, thought they had here got hold of that slippery region *Media*; hence the Friar Pascal (1338) makes it into *Medorum* Imperium, and the author of the Catalan Map (1375) into *Medeia*.

Andrea Bianco's work is of A.D. 1436, but as usual much of it represents a state of things gone by.

PALERMO, *November 9th*, 1874. H. YULE.

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M. KHANIKOF'S IDENTIFICATION OF NAMES IN CLAVIJO.

To the Editor of the "GEOGRAPHICAL MAGAZINE."

SIR,—M. de Khanikof's identification of the names in Clavijo's journey, as given in your magazine for this month is very interesting and valuable; but there is one of them, *the first*, which it is not easy to accept. This is the identification of Clavijo's *Tagiguinea* with the *Dzaghanian* or *Chaghanian* of old Oriental geographers.

The description of this as "a country on the *left* bank of the Oxus" is no doubt a slip of the pen. Not only was Chaghanian, however, on the *right* of the Oxus, but all the indications that I can find remove it far from any part of that river approaching Andkhoi, where

Clavijo introduces *Tagiguinea*. Moreover, I apprehend that Chaghanian, as the designation of an extensive province, belongs solely to an earlier age than that of Timur, though on this I speak with more diffidence.

The name *Chaghánián* is probably a plural, originally applied to a tribe, which has solidified into a singular applied to a territory. Probable instances of the same kind are very numerous on that frontier, *e.g.*, *Badakhshan*, *Wakhán*, *Talikán*, *Shignán*, &c., &c. The preservation of the terms *Badakhshi*, *Wákhi*, *Shigni*, as applied to natives, or to dialects of some of those regions, in preference to *Badakhsháni*, *Wakháni*, &c., seems to corroborate the suggestion. And in one of the oldest occurrences of the name *Chaghánián* it seems still to preserve its *Gentile* meaning. This is in a quotation from the historian Beladhori made by M. Garrez in the *Journal Asiatique* (Ser. vi., Tom. xiii., p. 179). In the year (A.D.) 650-651 the Arabs, in prosecuting the conquest of Khorasan, came into collision with the Hayátilah or Ephthalites. The Persians and Hayátilah together defending Talikan,* received succour "from the Saghanián and the Turks." This no doubt was on the south of the Oxus, but we must believe that the Saghanián, like the Turks, had come from the north bank of the river. For in a slightly earlier record, that of the Chinese traveller Hwen Tsang, we find the Chaghánián territory *(Chi-go-yan-na)* placed east of the province of *(Ta-mi)* Termedh, and west of *(Ho-lu-mo)* Garma or Karategin, and of Shumán, which appears to be part of modern Kuláb. This makes Chaghánián to correspond with the modern Hissár territory, perhaps excluding the part on the Oxus, which seems to be the *Kio-ho-yan-na* of the Chinese traveller, = Kúvádián. This agrees also with the position indicated in the geographers used by Professor Sprenger in his *Post und Reise Routen* (see especially p. 21 and map No. 5), only in these both Shúmán and Kúvádián are comprehended in Chaghánián. But there is no apparent extension westward, to bring us near Andkhoi.

As regards the obsolescence of the name, to prove *that* is of the nature of proving a negative, and is not easy. My strong conviction is that the name does not occur as that of a considerable territory during or after the time of the Mongol invasion. My impressions are, however, dependent on translated authorities; and if they are ill-founded, M. de Khanikof will readily correct them. The name occurs in Baber. *(English Transl.* 60, 61; *French Transl.* i., 121, 122†*)*, but only as that of a single town or fortress. From this town Baber's unruly comrade Báki Chaghániáni no doubt took his surname.

Though thus compelled to make strong objection to the identification of *Tagiguinea* with *Chághánian* or *Jaghánián*, it by no means follows that I can suggest a satisfactory identification; a thing I have often tried without success. At one time it appeared to me probable that it was *Juzgána*. This region *did* sometimes embrace Andkoi (see *Ibn Haukal* in *J. As. Soc. Bengal*, xxii., p. 161), and the name did continue at least to A.D. 1300, for Hammer quotes it from Wassáf, (H. writes *Dschusgánet*, *Ilchan* ii., 98‡) as in contemporary use. But I confess that the resemblance of names is not close enough to be satisfactory; and some derivative of *Tájik* or of *Táj* seems more probable.

PALERMO, *November 16th*, 1874. H. YULE.

* M. Garrez himself supposes *Talikán* to be a plural of the name of the *Hayátilah*, whose name appears in an old Armenian history as *Italakan*.

† M. Pavet de Courteille might have taken the trouble to give us an index to his Baber. The want of that was probably a much greater defect in Erskine's admirable book than a few petty faults of translation.

‡ The list in Wassaf, of places overrun in 1300 by Kotlogh Shah, the Chaghátaian chief, embraces another of M. de Khanikof's identifications. It runs: Shibrghán, Juzghána, Badakhshán, Kishm, Taikán, Dara-i-Yúsuf, Darú-i-Gaz, Firuz-Kuh *'Ali-ábád*, Malikábád, Merv, with its dependencies *Andkhoi*, Faryáb, Talikán, Merv-chak, Panj-deh.

Proceedings of Geographical Societies.

ROYAL GEOGRAPHICAL SOCIETY.

November 10, 1874.

PRESIDENT'S ADDRESS.

THE PRESIDENT, Sir Henry Rawlinson, took the chair at 8.30 P.M. Among those present were H.R.H. the Duke of Edinburgh, H.I.H. the Czarewitch; Count Beust, the Austrian Ambassador; Baron Hochschild, the Swedish Minister; Lord Houghton, Mr. Ward Hunt, Sir Alexander Milne, Admiral Sir Edward Belcher, Admiral Hornby, Admiral Richards, Sir George Campbell, Sir Bartle Frere, Admiral Collinson, Captain Evans, R.N.; Sir Leopold McClintock, Captain A. H. Markham, R.N.; Captain E. Stubbs, R.N.; Lieutenants Jeffreys, W. H. May, Rawson, and Arbuthnot, R.N., and Mr. Allen Young.

The PRESIDENT in his opening Address dealt at some length with the proceedings of the Geographical Section at the recent meeting of the British Association. Speaking of Arctic discovery, he said it was undoubtedly the most prominent geographical question of the day. The subject was fairly ventilated at the meeting of the British Association, where, besides listening to the interesting and instructive remarks of the President, the geographical section had the advantage of hearing an excellent paper by Admiral Sherard Osborn, on "Routes to the North Pole." Since then, however, all Europe has been aroused by the intelligence of the return of the Austrian Arctic Expedition, after being lost to sight for more than two years in the ice-bound regions of the Pole. This expedition, under Lieutenant Weyprecht of the Navy, and Lieutenant Payer of the Engineers, both experienced Arctic explorers, was prepared and supported partly by public subscription, and partly at the expense of Count Wilczek, who also accompanied it in the chartered yacht 'Isbjörn,' as far as Barent's Island, off Novaya Zemlya. The party were embarked on board the schooner 'Admiral Tegetthoff,' and left Barent's Island for the North, in August 1872. Very shortly afterwards the vessel was caught in the ice, and drifted with it, according to the currents, sometimes to the north-east, and sometimes to the north-west, till, after fourteen months of continued danger and anxiety, the floe in which the 'Tegetthoff' was fixed, joined the land ice in latitude 78° 51' N., and longitude 59° E. The winter was passed off this land, which was called after the Emperor, "Franz Joseph Land," and in the following spring—that is, in March and April of the present year—Lieutenant Payer explored the coast in sledges as high as 82° 5' (within 40' of Parry's furthest), and from this point observed land up to 83°, which was named Cape Wien, and which, if we except certain doubtful reports of American discovery, is the land nearest to the Pole that has yet been sighted on the face of the earth. The gallant officer to whom is due the merit of this great discovery is here to-day to recount his adventures, and to receive your marks of approval, having come from Vienna expressly to attend the opening meeting of our Society. He will explain how the expedition was obliged, on the 20th of May of the present year, to abandon the 'Tegetthoff,' and endeavour, with their sledge-boats, to reach Novaya Zemlya, which island, after incurring extreme dangers, they reached in a three months' journey, and from thence they were conveyed in a Russian vessel to Norway. Of all the interesting questions that will arise for consideration out of this long detention in the Arctic regions, the most important will probably be an attempt to ascertain whether the direction and duration of the currents which carried the 'Tegetthoff' with some fluctuation of longi-

tude, over five degrees of latitude to the north, were due to tidal influences or to physical causes connected with the distribution of ice, open sea, and land at the Pole. One result of this Austrian expedition is, at any rate, quite clear. It proves the absolute impossibility of reaching the Pole, *viâ* Spitzbergen, by sea, and thus furnishes an additional argument in favour of the route by Smith Sound, which the Royal Geographical Society have always advocated as the one most likely to afford access free of ice to a very high northern latitude. It is quite possible, however, that sledge journeys may be made along Franz Joseph Land, and the adjoining coasts, very much in advance of Payer's furthest; and it is understood that another Austrian expedition is now being organised for the purpose of thus extending and completing the line of discovery along this track so auspiciously commenced.

Having expressed regret that the British Government had not yet consented to send an Arctic expedition *viâ* Smith's Sound, Sir Henry went on to say: In Central Africa, since Livingstone's death, there has been a lull which contrasts strangely with the former activity. Cameron, who proceeded to Ujiji at the close of last year, and who there succeeded in recovering Livingstone's diary and map of his journey in 1866 from the sea-coast to lake Nyassa, without which the account of his travels now in the press could not have been completed, is understood to have been since navigating Lake Tanganyika, and it is to be hoped he will thus have had an opportunity not only of re-examining the northern end of the lake, with a view to the settlement of the hydrographical question which is in dispute between Livingstone and Stanley on the one side and Baker and Findlay on the other, as to the connection of Tanganyika with the Albert N'yanza, but also of determining positively whether there is any exit for the waters of the former lake through the Kabogo Mountains into the Lualaba, or on the eastern side through the Rufiji River to the sea. No direct intelligence, however, has been received from Cameron since the month of July; and it is quite possible, therefore, that ere this he may have obeyed the recall of the Society, which was forwarded to him from Zanzibar in April last, when the Society, having already disbursed from its own resources, on the Relief and Search Expedition, £2,300, in addition to the fund subscribed for the purpose by the public, decided that it could no longer sustain the expense of an independent exploration. At any rate, whatever may be the present aspect of the so-called Relief Expedition, it is gratifying to me to be able to record that a liberal public, in token of their sustained interest in Central African discovery, have recently, in answer to an appeal from Cameron's friends, subscribed another thousand pounds, in order to help him through his difficulties, and enable him to do justice to the work he is engaged on.

The indefatigable Mr. Stanley, also, is leading an independent expedition into Central Africa, at the expense of the proprietors of the *Daily Telegraph* and the *New York Herald*, who are already favourably known in their respective capacities as munificent patrons of research—the English journalists have recently sent Mr. G. Smith to excavate the ruins of Nineveh, while the American house supplied the necessary funds in 1871 for the discovery and relief of Livingstone. Mr. Stanley, accompanied by four Europeans, and well furnished with arms and other appurtenances of travel, had reached Zanzibar by the last accounts, and was preparing to start for the interior. It is believed that his main object is to supplement the labours of Livingstone, and it is thus supposed that he will direct his steps in the first instance to the so-called fountains of Herodotus, which lured our own hero traveller to his death; returning thence to the Katanga mines and the subterranean dwellings at Rua, and afterwards passing on to the Lualaba, and possibly to the nameless Equatorial Lake. The Geographical Society has no relations with Mr. Stanley, either direct or indirect; but admiring, as we do, his energy and address, and deeply interested, as we are, in the solution of the problems he has taken in hand, we naturally follow his footsteps with sympathetic and eager expectancy.

Then followed a survey of geographical progress in other parts of Africa and Asia, especial reference being made to the Russian surveys in Central Asia, and an indication of the more interesting papers which would be brought before the Society during the current session.

The PRESIDENT introduced Lieutenant Payer to the meeting, with a brief summary of what has been done by foreign nations in the way of Arctic exploration since our efforts relaxed, and a renewed expression of the regret felt by the members of the Society, and by the country at large, at our not undertaking, by means of a Government expedition, the task of reaching the North Pole. He announced that Lieutenant Payer's paper, which was written in German, had been translated at very short notice by Mr. Ravenstein, and that it would be read by the secretary.

THE AUSTRO-HUNGARIAN EXPEDITION.

Mr. CLEMENTS MARKHAM read Lieutenant Payer's paper, which was a lengthened and interesting account, in detail, of the facts stated in the President's Address. This paper, printed *in extenso*, forms our second article (p. 358), to which we beg to refer our readers.

Lieutenant PAYER, in a short explanatory address, said that when they abandoned the 'Tegetthoff' their equipment was of the simplest, for circumstances forbade anything approaching to luxury, and in addition to the clothes he wore upon his back, the personal property of each member of the expedition was limited to a blanket to sleep in. The provisions, ammunition, &c., for three or four months were packed in three, subsequently four boats, placed on sleighs, and in three large sledges, each weighing about 17½ cwts. Only the two strongest of the dogs were alive by that time, but even this small contingent proved of great service, for they pulled daily 9 to 10 cwts. between them. The deep snow which was encountered on first starting, compelled them to travel as many as five times over certain distances, for it required the united strength of the whole party to drag a single sledge or boat. Having reached the edge of the land ice they had to clamber with the boats and sledges from floe to floe, and sometimes to cross narrow fissures in the ice. Persistent southerly winds, moreover, destroyed the little progress they made, for they drove the ice, upon the surface of which they were travelling, to the north, and after two months of incessant labour they were not more than 8 miles from the ship. It almost appeared to them as if their struggle with the ice would end in a defeat, which would compel them to remain a third winter in their ship, uncheered by a ray of hope.

The ice around them was closely packed, and on several occasions they were compelled to lie quietly with their boats upon a floe of ice for an entire week, until it should please some channel to open. Northerly winds set in at length, on the 15th of July, which dispersed the ice to some extent, continuous rains reduced its dimensions, and by almost superhuman exertions they advanced 10 miles in the course of as many days. They were fully convinced by this time that no vessel would have succeeded in that year to reach the land discovered by them.

On the 7th of August they observed for the first time a swell, coming from the south, and indicative of the proximity of open water. This revived their sunken hopes, which fell anew when they again became ice-bound for the space of five days; but on the 14th of August they reached the edge of the pack, in latitude 77° 40′ N., and their safety seemed thus to be secured. Here they were reluctantly forced to abandon their sledges, and to kill the dogs, who had been their faithful companions and assistants in times of need, for the boats were hardly large enough to hold themselves and baggage, besides

which they were without water and provisions for their maintenance.

Their final salvation was due entirely to their finding the edge of the pack-ice in so high a latitude. Favoured by the weather they crossed the open sea in the direction of Novaya Zemlya, and followed the coast of that island towards the south. On the 18th of August they for the first time placed their feet upon *terra firma*, near the Admiralty Peninsula, and in the evening of the 24th—that is, after a passage of 96 days—they found themselves in the bay of Downs (latitude 72° 40'), on board the Russian schooner, 'Nikolai,' Captain Feodor Voronin, who received them with that heartiness which distinguishes the Russian people.

A speedy passage brought them to Vardö, and at 3 o'clock in the afternoon of the 3rd of September, 1874, they stepped upon the hospitable soil of Norway, full of that satisfaction which an escape from a position of danger and doubts brings with it.

The PRESIDENT then read extracts from a letter written by the German geographer, Dr. Augustus Petermann, of Gotha, which expressed a hope that the British Government would sanction an Arctic expedition, and again take the lead in this interesting exploration.

Admiral Sir E. BELCHER, who proposed a vote of thanks to Lieutenant Payer, expressed a decided opinion, based on his own experience, that such an expedition, if left untrammelled, to be conducted according to the judgment of one of the many officers we had who were competent for the work, might accomplish the task by way of Smith Sound in three years.

Admiral COLLINSON, who seconded the vote of thanks, referred to the fact—established by the 'Tegetthoff's' voyage—of there being a northern current to the east of Greenland, while the efforts of English explorers, *viâ* Baffin's Bay, had often been rendered nugatory by a southern set, as a matter which would have to be very carefully considered, as indicating a change in the ocean drift of the Polar Seas.

At the invitation of the President,

Count BEUST offered a few remarks, expressing his sensibility of the honour which had been done Lieutenant Payer and his brave companions by the Royal Geographical Society, and returning thanks in the name of the country he represented, to which, he said, such a tribute to two deserving young officers would be most gratifying. Making some amusing references to the affinity between science and diplomacy, he said there was, however, this difference, that while humanity rejoiced at every new discovery of science, they generally felt uncomfortable on hearing of things being discovered by diplomacy. He claimed to have made one discovery himself, though that had not the merit of novelty—namely, the warm sympathy and generous appreciation by Englishmen of every honourable achievement of a foreigner.

The resolution being unanimously carried,

Lieutenant PAYER expressed his warm thanks for the honour which had been done him by the invitation sent by the Royal Geographical Society to appear before so brilliant an assembly on the occasion of the opening of the session.

November 23rd, 1874.

WARBURTON'S JOURNEY ACROSS AUSTRALIA.

SIR HENRY RAWLINSON, the President, took the chair at 8.30 P.M. Among those present were Admiral Sir Alexander Milne, Sir Charles Nicholson, Sir Rutherford Alcock, Sir George Campbell, Sir Frederick Arrow, Admiral Sherard Osborn, Colonel P. Egerton Warburton, Mr. Galton, Mr. Allen Young, Lieutenant Payer, and Captain Hardinge, R.N.

The PRESIDENT read the letter from Mr. Disraeli announcing the determination of the Government to despatch an Arctic Expedition next spring, which was warmly applauded. Sir Rutherford Alcock then proposed, and Admiral Sherard Osborn seconded, a cordial vote of thanks to the President for his successful exertions in furthering the cause of Arctic exploration.

It was announced that news had been received from Colonel Gordon at Gondokoro up to the 5th of September. The sections of the steamer were then at Mount Regiaf, below the falls, and it was expected that they would be above the falls and that the steamer would be put together, and ready to enter the Albert Nyanza, in a fortnight from that time.

Sir HENRY RAWLINSON announced that the paper of the evening would be an account of Colonel P. Egerton Warburton's remarkable exploring journey across Australia from Alice Springs to the west coast; and, in introducing Colonel Warburton to the meeting, Sir Henry mentioned that his admirable work had obtained for him the gold medal of the Society. Nine gold medallists had obtained that honour for exploring work in Australia. First came Governor Eyre in 1843, then Count Strzelecki, Charles Sturt, and Dr. Leichardt, A. Gregory in 1857, McDougall Stewart—the first to explore the telegraph line—in 1861, O'Hara Borke in 1862, Frank Gregory in 1863, and Colonel Warburton in 1874.

Colonel WARBURTON said that he felt sure that the presentation of the gold medal to him would act as an incentive to further exploration. Starting from Adelaide he proceeded, with camels, to Alice Springs, on the line of telegraph, a distance of 1100 miles, which he reached in December. On the 15th of April he started on his long journey to the westward. For the first 200 miles, along the McDougall range, there was pasture and water, but beyond nothing save spinifex grass and ridges of sand; a dreary and barely inhabitable waste.

Speaking of the inhabitants he said that they were afraid of the party, and that they were difficult to find. The explorers were anxious to catch them, in order that by keeping one without water, he might be compelled to show them where water was. Once they caught a girl, and tied her by the neck to a tree, but she gnawed through the rope and escaped, running off on tip-toe to prevent them from following her trail. These natives are the very lowest in the scale of humanity. They have no huts, and even no shelter but the shady side of a bush. As to clothing, the men pass the shank bone of a wallabee through their noses, and are in full dress. As for the dress of the women, Colonel Warburton could say nothing, as there is nothing to say.

No animals but camels could have taken the party, for there is not a blade of grass for hundreds of miles. The camels were most patient and easily managed, but it is necessary to have a master bull among them, to keep the younger ones in good order. Colonel Warburton and his party were obliged to eat seven of these camels, and, when worked until they cannot stand, their meat is tough and dry. A bucket of such meat never produced a single bubble of grease on the surface, and the taste was like the inside of a carpenter's glue-pot. They were driven, by absolute starvation to such food. The party took six months' provisions, but the journey lasted nine months, and latterly they had no flour, tea, salt or sugar; nothing but camel meat scraped off the bones, and dried in strips on bushes.

Finally, they had to make a rush for the Oakover River, a distance of 160 miles. It was neck or nothing. If the camels could not do it they were lost. When they reached the river it was dry, and they were unable to go further. There were only two camels left, and none of the men could walk a hundred yards, while the nearest station was on the De Grey River, 150 miles further on. The two strongest of the party were sent on the remaining camels to look for the station and get help; while the rest waited for many days, gradually starving. At length, abundant help came from the station of Messrs. Grant, Harper, and Anderson, to whom the explorers owed their lives. They were made

guests of the colony of West Australia, and were franked back to Adelaide.

Sir CHARLES NICHOLSON asked what was the character of the vegetation, and whether any localities could, in process of time, be made use of for purposes of pasture, notwithstanding the unpromising appearance of the country.

Colonel WARBURTON replied that a great part of the country south of Alice Springs is excellent pasture land, as well as to the north of the McDougall ranges, but that the region explored by him to the westward is high sandy land, which is never likely to be occupied. There is no grass, and no animals except the wallabees, which can do without water. The natives live on the wallabees, burning the spinifex grass, and knocking them on the head as they rush out. There is also an acacia with small, hard black seeds on which the natives feed, and some forests of fine casuarina trees. But, as a rule, the country consists of mere ridges of sand with intervening flats, without water, and uninhabitable.

In closing the meeting the thanks of the Society were voted to the Honourable Mr. Elder and Mr. Hughes, the supporters of the expedition, as well as to Colonel Warburton.

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THE DUTCH GEOGRAPHICAL SOCIETY.

THE fifth meeting of this Society was held at Rotterdam on the 20th of last June; the Patron, Prince Henry of the Netherlands, being present. The number of members was reported to have increased to 435; and presentations of maps were acknowledged, including a set of the Indian atlas, and Colonel Walker's map of Turkistan, from the Geographical Department of the India Office.

The first paper, by Mr. J. K. J. de Jonge, was an account of the journey of Lycklama à Nyeholt to Persia in 1866, described in his work entitled *Voyage en Russie, au Caucase, et en Perse*. Mr. de Jonge also gave an interesting account of the history of commerce between Holland and Persia, of the foundation of Dutch factories at Ispahan and other places, of the flourishing state of this trade in the days of Abbas the Great, of its decline in 1722, and how, in 1765, it had ceased to exist. Mr. de Jonge suggested that this would be a good time for attempting to resume commercial intercourse between Holland and Persia, by means of steamers touching at Máskat, Aden, and Jeddah.

The second paper was on the proposed exploring expedition to the east coast of Sumatra by W. F. Versteeg. This undertaking was first suggested by F. de Casembroot. Some parts of Palembang are still very little known, as well as the districts of Jambi and Korintji, and it is believed that the river Jambi flows through a rich country the examination of which will yield most valuable results. The reading of the paper was followed by a discussion, in the course of which Prince Henry said that the Government would assist the Society in organizing the proposed expedition. Mr. A. J. Ten Brink spoke on the past and future of the Banda group, and described the principal islands.

The present number of the *Proceedings* (No. 3) was issued in October. Besides the report of the meeting of June 20th, it contains a very complete and interesting history of the expeditions of Miss Tinné, by N. W. Posthumus, illustrated by two maps; and a notice by Mr. J. P. Amersfoordt of Jan Pieterszoon Dou, one of the leading hydraulic engineers of Holland in the days of Prince Maurice (he died 1635).

Professor Veth has delivered the second part of his exhaustive review of the progress of geographical knowledge and discovery in all parts of the world, which also appears in this number. The first part of this address had been delivered on the 11th of April. Professor Veth not only touched upon the progress of all exploring expeditions, but reviewed every geographical publication of importance that has recently appeared.

Among the communications, in this number, is the announcement of the discovery of a new island, about a mile and a half in length and covered with vegetation, by the Dutch steamer 'Hertog Bernard,' in the present year. The island is 15 miles west of the island of Simo, in 97° 36′ E. longitude, and 0° 2′ S. latitude; and is not to be found on any map. The number concludes with an account of the discoveries of the Austro-Hungarian Arctic Expedition.

M. M.

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FRENCH GEOGRAPHICAL SOCIETY.

Bulletin for June.

THE June *Bulletin* opens with a description of Dahomey by Abbé Bouche, who cites several commercial products of this region, such as sugar-cane, cotton, caoutchouc, indigo and other dyes, palm-nuts and oil, as of themselves sufficing to give great importance to any scheme for acquiring a better knowledge of the country. Lagos, Badagry, Porto Novo, and Appi are the best *points d'appui* for interior exploration, and it is from hence that one stands the best chance of meeting the caravans which come from Marocco, Tunis, Tripoli, and Egypt, in quest of cotton, copper, iron, gum-arabic, ivory, and silver. There is a great mass of information—much more than is generally imagined—the Abbé thinks, in existence respecting this part of Africa, and he consequently proposes soon to compile a history of the country from the 17th century, that is a little before the foundation of the kingdom of Dahomey, all the material for this being directly available from printed works in France. The Slave Coast is low and sandy, and studded with lagoons, and, as far as the 7th degree of latitude, is of very recent formation, being, in fact, mainly caused by the sand deposited by the Guinea current, and by the detritus brought down by rivers from the interior. The landscape is charming, and the country most productive, but the tillers of the ground are constantly being deprived of the fruit of their labour by the rapacity of their sovereigns. The population is much larger than is generally supposed, towns containing thirty, forty, and fifty thousand inhabitants being not rare, but the people are mostly scattered over the country in groups of two, three, or four houses, from which they can easily decamp in case of the approach of an enemy. The population is divided into two great clans or families—the Jejis and the Nagos, the former a savage and greedy race, numbering about two millions; the latter about four millions and who, by their gentle manners, hospitality, industry, and intelligence form a pleasing contrast to their neighbours. The language spoken by the Nagos is remarkable for the number of consonants used: the inhabitants of Dahomey speak the Jeji. But nearly all the various languages spoken on the coast are but dialects of the same mother tongue, and any traveller with a decent knowledge of Arabic and the Nagos tongue would find little difficulty in traversing the continent from Algiers across the desert by way of the Sudan and Nyfi to Lagos. The language spoken by the people of Yoruba to the north-east contains some Hebrew words. The Abbé Bouche mentions that he was the more surprised at this circumstance as El-Edrisi, an Arabian traveller of the 11th century, states that the country now occupied by the Nagos was in his time peopled by Jews, while des Marchais also states that at the beginning of the 17th century the negroes there practised several observances which savoured of Judaism. The local traditions relate that the first inhabitants of Yoruba came from a far country across the sea, and disembarked at Abbeokuta. If this be true, it must be dated very far back, as Abbeokuta is 50 miles from the coast, and the land must have taken a considerable time to gain upon the sea to that extent. The country between the Volta and the Benin formerly

constituted the large kingdom of Ardres, the capital of which was Ardra or Allada. Towards the beginning of the 17th century, this sovereignty was split up into small states, which eventually became tributaries of the powerful empire of Nagos. In 1861 the English obtained the cession of the kingdom of Lagos on the coast, for an allowance of 1000*l.* per annum, and the following year acquired Palma and Leckie. Slavery then ceased along the coast line of the British possessions, and legitimate commerce sprung up. The value of business now done in Lagos alone exceeds one million sterling.

The Abbé Bouche describes the perilous crossing of the bar on the occasion of his visit to Lagos, and his reception at the hands of the French consular agent. Lagos is extremely unhealthy, and little wonder when we read that between one and two hundred yards from the merchants' houses is situated the burying-place, where the corpses are never interred deep for fear of starting water, which in Lagos is always found a few feet below the surface. The Abbé found the negroes rather spoilt by English rule than otherwise: compared with other inhabitants of the coast, they are arrogant and indolent.

From Lagos, the Abbé Bouche made his way by boat to Badagry along a species of natural canal which joins the coast lagoons, and thence on to Porto-Novo. The western portion of the canal or river here alluded to formerly did not exist; some Portuguese maps of the 16th century show that the Uellon River then discharged itself into the ocean where a narrow neck of land now intervenes, but that one night the river broke down the bar of sand which separated it from the marshes eastward, and has continued flowing in that direction ever since. Porto Novo is a place of some importance as the outlet of the trade of Yoruba and the interior states; the French partly recognized this in 1863, and established there a protectorate under Baron Didelot; but it was abandoned the following year, the English being thus left supreme on the coast. The Abbé concludes the narrative of his journey with a wish that France may again turn her attention to a country so richly gifted by nature as this portion of Africa.

The other articles are, an account of the Rio San Francisco and the Rio das Velhas, rivers of Brazil, by the Abbé Durand; a translation of a short account of the Khanate of Kokan and the surrounding regions, by the late M. Fedchenko, with notes thereon contributed by Colonel Yule; a letter from Dr. Schweinfurth to M. Duveyrier, on the great oasis of the Lybian Desert; and a short account by the French Consul-General at Valparaiso, on the colonization of the Magellan territory contiguous to the straits of the same name.

Bulletin for July.

THE July *Bulletin* opens with a notice by Captain de Contenson, of the inundations which for the last four years have been laying under water to the depth of between 3 and 5 feet, on an average 40,000 square kilometres, in the country around Tien-tsin. This part of China was formerly rich and prosperous, but its population is now terribly reduced by this calamity, for which no remedy has as yet been found. Some of the inhabitants have emigrated northward of the Great Wall, whither other agriculturalists, driven by the movements of the Yellow River, had settled down and converted an uninviting pasture land into vast tracts waving with wheat and oats. These movements of the Yellow River were primarily occasioned by political disorders, such as the Taiping and other rebellions, which interrupted the construction of dams and other works necessary to keep the stream in check. In consequence, in 1857, the great river burst its bounds just below the city of Kai-fung and changed its course from eastward to north-east, in which direction it has flowed ever since, discharging its waters into the Gulf of Petchili. But Captain de Contenson contends that it is not possible for the Hoang-Ho to occasion the Tien-tsin inundations, and adduces as his chief reason the facts that in 1868, Ney Elias found the Imperial Canal (the only channel along which the waters could flow into the Tien-tsin plains) almost dry, and the Hoang-Ho deepening its bed. He argues, on the other hand, the inundations cannot but be occasioned by the streams to the north of Tien-tsin, which descend from the Mongolian plateau and traverse a steep decline with sparse vegetation. Though in winter these streams are but a tiny thread, they increase enormously in volume from May to September, when the rains descend in torrents three or four times a week, and with all the more force on account of the scantiness of forests and vegetation, which in other regions serve to economize and distribute the downpour. Captain de Contenson's remedy for this evil is the construction of reservoirs to hold the summer rains and so equalize the supply of water to the streams, which might thus, he argues, become navigable. The construction of reservoirs would be an easy matter, any number of workmen being available at 2½*d.* a day.

The next article is a detailed description of the Rio-San-Francisco of Brazil, by the Abbé Durand, which in its turn is followed by a memorandum on a new topographical survey of the group of which Mont Blanc forms the centre, by M. Viollet le Duc, a paper originally read by the author before the Geographical Society on the 28th of March last. We find next a description of the new map of Mexico on the scale of 1:3,000,000, which has been prepared at the Dépôt de la Guerre by Staff-Captain Niox, from surveys executed on the spot by officers attached to the expeditionary force. A memoir on the recent triangulation of Corsica by Captain Perrier comes next. The captain points out that from 1770 to 1791 Franchot was engaged in executing a triangulation of the island, and that he united it to the coast of Tuscany by a series of forty-six triangles extending from Leghorn to Cape Argentale. In 1827 Durand, while engaged in triangulating between Marseilles, Aix, Castellane and Nice, descried the mountains of Corsica, and was able to unite his measurements to those of Franchot, by fixing Monte Cinto and Paglia Orba, which were no less than 195 and 267 kilometres distant respectively. The recent triangulation was commenced in 1863, and consists of sixty-five triangles of the first order, comprising a chain extending from Turghio-Carghese in the west and bifurcating thence to the north and south, and several supplementary triangles leading from this chain to the coast line. The result of Captain Perrier's measurements proved that Monte Cinto is the highest mountain in Corsica.

The last article of note is a short review of a recent memorandum by M. Charles Grad, on the "foehn" wind of Switzerland, a dry warm wind which he argues is analogous to the Sirocco, and is only a local modification of the great aerial current which flows from the Equator to the Pole.

NOTICE.

The Office of THE GEOGRAPHICAL MAGAZINE *is at* 57 & 59, *Ludgate Hill, E.C.*

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Letters and Articles intended for insertion should be written on one side of the paper only, and must be accompanied by the name and address of the writer; not for publication, but as a mark of good faith.

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